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H. L. Shantz

THE SZECHWAN VILLAGE FAIR
J. E. Spencer

POPULATION OF QUEBEC PROVINCE
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George F. Brightman

CENTRAL CITY MINING AREA
H. A. Hoffmeister

CLARK UNIVERSITY, WORCESTER, MASSACHUSETTS, U.S.A.

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DAIRYING

DAIRYING represents an industrial adjustment to environment as refined and balanced as any in man's culture. It involves almost every major phase of man's use of the land—pastoral, sylvicultural, agricultural. It necessitates a high development of technological skill, equipment, and organization. It requires widespread coöperation, nice discrimination, and sound administration. It affects the economic and social structure of society. It is a product of advanced civilization.

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The importance of the dairy industry in the world's economy cannot be gauged by any statistics of capital, employment, or finance. The vital interest of the home dairy with all its implications of domestic intimacy and fellowship; the part of green pastures and tranquil herds in the grace and hospitality of any landscape; the dramatic aspects of nomadism and pastoralism and transhumance; all these combine to make dairying one of man's attractive and profitable employments.

ECONOMIC GEOGRAPHY

VOL. 16 JANUARY, 1940 NO. 1

AGRICULTURAL REGIONS OF AFRICA

PART I—BASIC FACTORS

H. L. Shantz

AFRICA, one of the continents first known to civilized man, is the last to come under his control.

A large block of land of over eleven million square miles is almost unbroken by indentation of shore line. Not many islands lie offshore to form bases for operations inland. Unhealthful coast climates, and mountain and desert barriers shut off the interior. The north coast is an island between the Mediterranean and the Sahara. In the southeast and southwest high mountains offer a barrier to travel and most effectively block the rivers to sea-going vessels. The Gambia is open for navigation for about 250 miles; the Niger is navigable for light craft when once a channel is found in the great delta; the Congo is blocked 100 miles from the ocean; and the Orange River is entirely useless. South and East Africa have harbors, but the rivers are not good, navigable waterways. The Zambezi, since a channel was found in the great delta, furnishes a shallow river for 400 miles where it is then blocked. The Rufiji also has a delta. Africa resisted geographically the inroads of civilization.

East Africa was far from Europe, and world trade routes, running east and west, did not force the opening of the interior of the continent. Largely due to geographic influences, Africa was known mostly as a series of coast lines until the middle of the nineteenth century. Egypt was an island, limited by deserts on the east and west, by great swamps and unhealthful climate on the south, and by a difficult terrain and warlike people in Ethiopia.

North Africa was thought of more as a part of Europe than as another continent. West Africa was a trading coast line, furnishing slaves to the rapidly expanding plantations of the New World. East Africa was considered part of Asia and Malasia, and was dominated largely by Arabs.

The continent of Africa lies exactly on the equator and is in this respect unique among the continents of the world. It extends to about 37 degrees north latitude and about 35 degrees south latitude. Its width is about equal to its length. Notwithstanding its equal extension north and south of the equator, the land area north of the equator is about twice the area of that south of it. But the desert areas in the north so far exceed those in the south that the area of land with crop-producing capabilities under natural conditions of

rainfall is about equal north and south of the equator. About half of the productive land lies in the tropical zone.

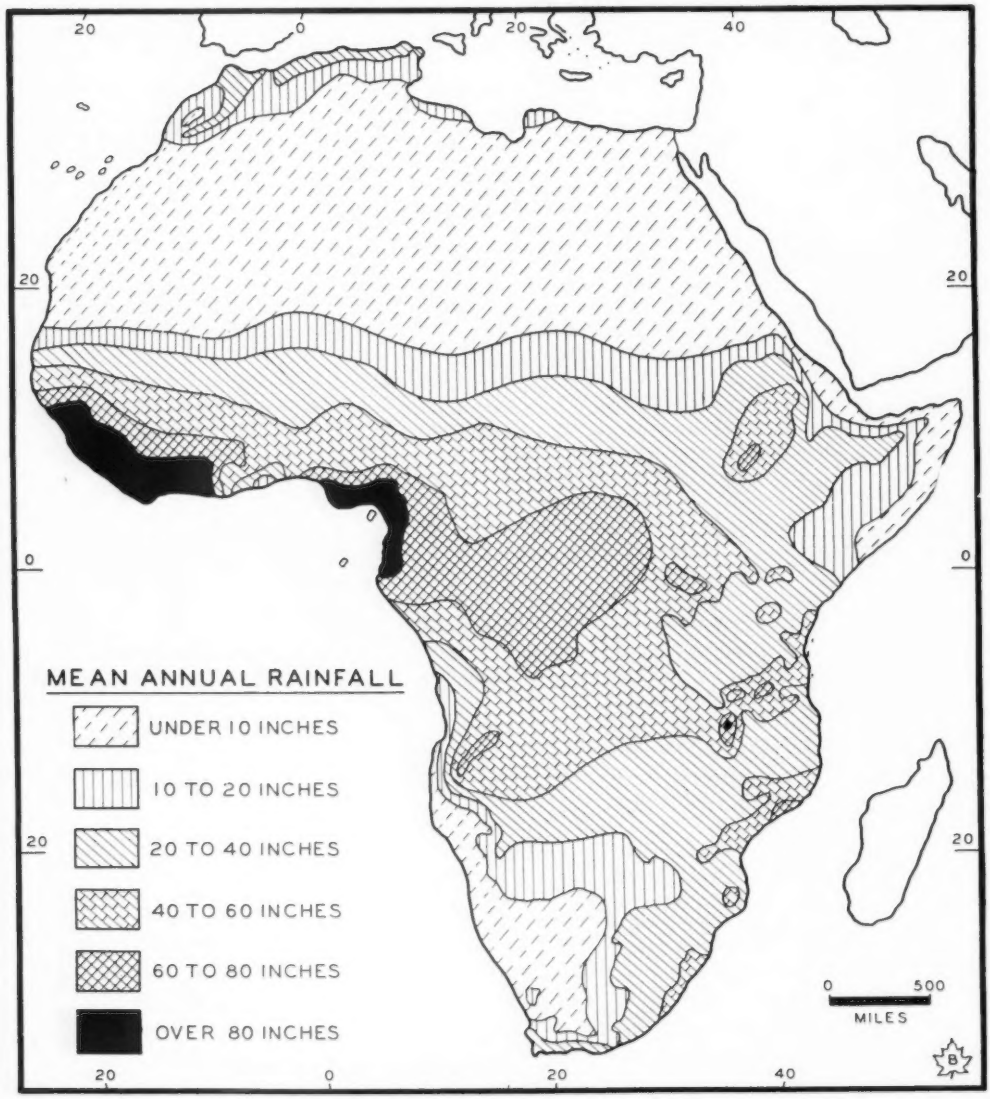

FIGURE 1.—Rainfall of Africa (after Kincer). There are two centers of heavy annual rainfall: one of 400 inches or more at the coast in the Cameroons, and one on the Liberian coast of 150 inches. The area with over 60 inches of annual rainfall includes the Guinea coast from Portuguese Guinea in the west to Northern Territories in the east, southern Nigeria and the Cameroons, and much of the Belgian Congo and adjacent French Equatorial Africa. There are also isolated areas on the higher portions of the east African highlands. The drier portion of the continent, that under 10 inches of annual rainfall, includes the Saharan and Libyan deserts, the lowlands bordering the Red Sea and the Gulf of Aden, and the Italian Somaliland coast to as far south as the equator. Another desert area in which the rainfall drops to one inch annually along the coast, is the Namib, and the area under 10 inches in South Africa includes the coast from Benguella in Angola south to the mouth of the Oliphants River, and occupies most of the Karroo, Karroid Plateau and the southern part of the Kalahari. In general terms the southeast coast and the Guinea coast are wet; the southwest coast, and the northeast and northwest coasts are dry. The north coast, except as influenced by highlands, is also dry. Africa as a whole has half its land area too dry for the successful production of cultivated crops.

TABLE I

ACREAGE UNDER EUROPEAN OCCUPATION AND CULTIVATION, AND ACREAGE DEVOTED TO EACH OF THE PRINCIPAL CROPS

Country and Possession	*Date*	*Occupation Acres*	*Cultivation Acres*	*Acres in Principal Crops in Order of Importance*
North East Africa				
Ethiopia	1931[1]	Very little	Very small area	Coffee
Somaliland (French)	1930[2]	Very little	Very little	None
Somaliland Protectorate (British)	1931[3]	None	None	None
Eritrea (Italian)	1929[4]	42,000	Not available	Data not separate. See Table III for crops
Somaliland (Italian)	1929[5]	Uncertain	70,000[6]	Data not separate. See Table III for crops
Egypt	1927–8[7]	531,003		Data not separate. See Table III for crops
Anglo-Egyptian Sudan (British and Egyptian)	1928[8]	None	None	
East Africa				
Uganda Protectorate (British)	1929[9]	253,447	30,315	Coffee 18,167, rubber 10,748, tobacco 368, tea 342, cotton 262, maize 118, miscellaneous 310
Kenya Colony and Protectorate (British)	1929[10]	7,173,760	644,795	Maize 245,807, sisal 109,375, coffee 90,205, wheat 66,089, barley 14,539, sugar cane 11,161, coconuts 8,568, tea 5,591, miscellaneous 28,041, cultivated and not planted 65,419
Zanzibar Protectorate (British)	1929[11]	None	None	
Tanganyika Territory (British Mandate)	1929[12]	2,504,067		Chiefly sisal, coffee 27,778, cotton 1,120, maize 1,000, coconuts rank not given
Urundi and Ruanda (Belgian Mandate)	1929[13]	14,013	9,261	Cotton, eucalyptus and coffee, oil palm, sisal, black wattle, food crops, tobacco
Nyasaland Protectorate (British)	1929[14]	4,033,793	60,177	Tobacco 19,269, timber and firewood 11,144, tea 8,866, sisal 8,270, maize and millet 3,845, beans 1,860, coffee 1,331, rubber 1,330, cotton 1,219, wheat 393, groundnuts 104
Northern Rhodesia (British)	1929[15]	11,951,037	54,080	Maize 39,215, cowpeas 3,845, tobacco 3,232, wheat 2,698, groundnuts 1,130, cattle melons 740, velvet beans 737, beans 685, cotton 234, coffee 162, potatoes 151, oats 119
Southern Rhodesia (British)	1925–6[16]	19,322,500		
	1927–8[17]		407,118	Maize 295,290, tobacco 46,422, groundnuts 6,982, wheat 3,272, sunflower 3,251, orchards irrigated 2,493, eucalyptus 6,054, oats 1,580, beans 2,945, potatoes 1,829
Portuguese East Africa (Portuguese)	1928–9	2,750,000[18]	514,544[19]	Coconuts 142,562, sisal 65,941, maize 59,488, sugar cane 32,254, pineapple 31,194, cotton 26,798, coffee 25,944, mafurra 25,814, fruit of trees 22,745, French beans 9,540
Madagascar (French)	1926[20]		285,607	
	1930[21]			Rice, cassava, vanilla, coffee, cloves (order not known)
South Africa				
Basutoland (British)	1930[22]	None		
Bechuanaland Protectorate (British)	1928	1,324,000[23]	31,740[24]	Tobacco, cotton, citrus fruits
Swaziland (British)	1921[25]	938,736	16,253	Maize 11,371, cotton 2,774, Kaffir corn 673, tobacco 463, beans 237
Union of South Africa (British)	1927[26]	230,186,839	10,391,149	[27] Maize 5,191,602, wheat 880,529, oats 579,938, teff grass 264,707, sugar cane 245,248, lucerne 179,906, Kaffir corn 172,179, rye 138,155, peas and beans 90,200[27a], potatoes 68,711

Country and Possession	*Date*	*Occupation Acres*	*Cultivation Acres*	*Acres in Principal Crops in Order of Importance*
Transvaal	1927[26]	38,432,133	3,075,705	[27] Maize 2,039,663, teff grass 168,415, Kaffir corn 102,796, wheat 82,769, orchard 60,200[27a], oats 52,505, tobacco 27,519, cotton 25,667, potatoes 22,526
Orange Free State	1927[26]	30,518,390	3,051,632	[27] Maize 2,485,910, wheat 194,745, oats 117,823, teff grass 79,910, Kaffir corn 30,926, rye 28,337, lucerne 19,491, orchard 17,000[27a]
Natal	1927[26]	10,281,869	1,207,340	[27] Maize 413,601, sugar cane 245,248, cotton 37,348, Kaffir corn 21,927, bananas 10,440[27a], teff grass 8,985, oats 8,697, orchard 8,400[27a], potatoes 6,614, tea 3,420[27a]
Cape of Good Hope	1927[26]	123,414,447	3,056,472	[27] Wheat 601,491, oats 400,913, maize 252,427, lucerne 147,165, rye 107,027, orchard 87,200[27a], barley 62,309, vineyards 58,910[28], potatoes 20,793, pineapples 10,800[27a]
South West Africa Mandate	1913	33,082,206[29]		
	1928	23,429,461[30]	42,233[31]	[32] Maize, potatoes, Kaffir corn wheat, tobacco, citrus
West Africa				
Angola (Portuguese)	1924[33]		35,400	Sugar cane 35,000, cacao 3,400, also sisal, coffee, palm oil
Congo (Belgian)	1929[34]	9,188,316	193,950	Coffee 56,974, oil palm 44,525, rubber 16,012, cacao 14,934, sisal 2,874, also millet, maize, eleusine, manioc, bananas, yams, sweet potatoes, peas, beans, groundnuts (rank not available)
Equatorial Africa (French)	1924[35]	111,200	3,200	Cacao, coffee, vanilla
Guinea (Rio Muni) (Spanish) / Fernando Poo (Spanish)	1929[36]		Small plantations	Cacao 58,068 (plantation and native)
Cameroons (French Mandate)	1929[37]	128,868		Tobacco, and a small amount of oil palm, cacao and rubber
Cameroons (British Mandate)	1929[38]	297,018	54,064	Cacao 16,475, palms 9,068, rubber 6,982, bananas 5,201
Nigeria (British)	1929[39]	None	None	
Togoland (British Mandate)	1928[40]	Apparently none	Apparently none	
Togoland (French Mandate)	1931[41]	Apparently none	Apparently none	
Dahomey (French)	1929[42]	4,650		Cotton, coffee, oil palm, cacao, castor bean
Ivory Coast (French)	1929[43]	46,600		Cacao, coffee, cola, sisal, oil palm
Gold Coast, Ashanti and Northern Territories (British)	1929–30[44]	None	None	
Liberia	1926–7[45]	57,000	Not available	Rubber
Sierra Leone Colony and Protectorate (British)	1929[46]	None	None	
Guinea (French)		13,583[47]		
Guinea (Portuguese)	1925	357,739[48]	Not available	Oil palm, sugar cane
Gambia Colony and Protectorate (British)	1929[49]	Apparently none	Apparently none	
Senegal (French)	1930[50]	51,829	7,346	Sisal 3,136, manioc 1,606, groundnuts 1,161, food crops 371, hemp 62, fruits 37, castor beans 20
North Africa				
Rio de Oro and Adrar (Spanish)	1930[51]	None	None	
Ifni (Spanish)	1930[51]	Apparently none	Apparently none	
Morocco (Spanish)	1930[52]	Very little	Very little	
Morocco (French)	1929[53]	1,786,165	528,915	Wheat 260,265, oats 108,378, barley 78,046, peas 14,682, maize 13,842, beans 13,079, chick peas 9,798
Algeria (French)	1928–9[54]	Not available	2,245,400	Wheat 1,116,815, oats 439,640, barley 429,488, chick peas 38,028, potatoes 35,244, peas 34,008, beans 25,026, citrus fruits 17,334, tobacco 15,115
Tunis (French)	1927[55]	752,349	432,163	Wheat 281,244, vines 68,574, oats 43,521, barley 38,824

Country and Possession	*Date*	*Occupation Acres*	*Cultivation Acres*	*Acres in Principal Crops in Order of Importance*
French Sudan (French)	1921[56]		7,907	
	1930[57]	7,756		[58] Millet 928, groundnuts 528, cotton 467, niebes 353, maize 143, velvet beans 84, rice 40, manioc 35, crotalaria 20
Territory of the Niger (French)		Apparently none[59]		
Upper Volta (French)		Apparently none[59]		
Mauritania (French)		Apparently none[59]		
Tripolitania (Italian)	1930[60]	795,952		Olives 60,364, almonds 13,726, vines 8,794
Cyrenaica (Italian)	1929[61]	100,115	Not available	

[1] Great Britain Department Overseas Trade "Economic Conditions in Ethiopia 1929–31." Mentions four European coffee plantations in Arussi.

[2] Great Britain Foreign Office Handbook 109—French Somaliland, London 1920, p. 20. "French Official Reports recognize explicitly that there are no great developments possible for local agriculture or other industries. An attempt to introduce the date palm in the neighborhood of Jibuti has been fairly successful. Cotton growing was a complete failure and has been abandoned. The water supply is sufficient to enable fruit and vegetables to be grown in plenty for local requirements but in the absence of perennial rivers and the uncertainty of underground supply, irrigation on any considerable scale seems to be impossible. Flocks and herds of natives furnish them with means of subsistence and supply Jibuti abundance of meat and milk."

Sir Hesketh Bell, *et al*, Vol. 3, Paris 1930, p. 100, describes a garden of about a kilometer in length and one hundred meters wide having some coconut trees, palm trees, and pomegranate trees, casting a little shade on beds of legumes on the sandy soil mixed with shells and madrepores.

[3] Colonial Reports, No. 1570, Somaliland, 1931, p. 7. "There is no European ownership or interest of any kind in agriculture in the country so that all efforts at improvement of any kind have to be carried out by the government."

[4] Ministero della Colonie: Le Colonie Italiane Di Diretto Dominio, Anno 1929, p. 47. One hundred and eighty-two concessions, about 17,000 hectares, some of which are on the plateau, and some on the lowlands.

[5] Bottistelli, V.: Africa Italiana, firange, 1930, p. 121. Says more than 21,000 hectares in the vicinity of Genale are being developed, and that about 18,000 hectares will be planted to cotton, cereals, and oil seeds.

[6] Statesman's Yearbook, 1930, p. 1035. Mentions Italian plantations in the districts Merca-Genale and Villaggio Duca degli Abruzzi.

[7] Statesman's Yearbook, 1929, Extent of holdings: foreigners 511,564 feddans (531,003 acres); natives 5,157,213 feddans (5,353,187 acres) as of December 31, 1927.

Statesman's Yearbook, 1930, p. 822, gives slightly lower figures as of December 31, 1928.

[8] Anglo-Egyptian Sudan—In a letter from Civil Secretary, Sudan Government (R. K. Winter)—Jan. 8, 1928, "Practically all agricultural land is in native possession or subject to native rights." Sir John Maffey, Governor-General of the Sudan, The Times, London, March 13, 1928, p. XIII. "In the field of agriculture our problem is simplified by the fact that the country does not and cannot attract white settlers, and that, while assisting agricultural development by the most modern methods of research to a point which has made the high grade cotton of the Sudan famous in the markets of the world, the policy of the Government has everywhere safeguarded the native owner in his title to the land."

[9] Uganda Protectorate—Blue Book for the year ending December 31, 1929.

[10] Colony and Protectorate of Kenya, Blue Book for year ended 31st of December 1929. Section 22, page 3.

[11] Zanzibar Protectorate, Blue Book for the year ended 31st of December 1929, p. 132. "All land other than native reserves is privately owned, and there is therefore no system of alienation." There are only 270 whites in the protectorate, according to the 1921 Census.

[12] Tanganyika Blue Book for the year ended 31st December 1929, p. 193. Handbook of Tanganyika, Chief Secretary's Office, London, 1930, p. 252. Non-native holdings are as follows: Number of holdings 1,985; leasehold acres 1,190,274; freehold acres 776,668.

[13] Rapport Sur L'Administration Belge Du Ruanda, Urundi Pendant Annee, 1929, p. 124. The companies that have made these developments have the right to occupy about 16,000 hectares more than the figures here given.

[14] Nyasaland Protectorate—Annual Report of the Department of Agriculture, 1926. (Zomba 1927), p. 3. Nyasaland Protectorate Blue Book for the year ended December 1929 (Zomba 1930), p. V 1–3.

[15] Northern Rhodesia—Blue Book for the year ended 31st of December 1929, p. V 2–3.

[16] Official Yearbook of the Colony of Southern Rhodesia, 1930, p. 303.

[17] Southern Rhodesia—Report on the Summer Crops for the Season 1927–28 and the Winter Crops and Livestock Returns for 1928, Salisbury, 1929, p. 42–43.

[18] The Portuguese Colony of Mozambique—Government Printer, Lourenzo Marques, 1929, p. 88. Concessions for agriculture and forestry together are given as 3,682,580 acres. Republica Portuguesa Colonia de Mocambique; Anuario Estatastico, Anno de 1930, p. 387.

[19] The Portuguese Colony of Mozambique—Government Printer, Lourenzo Marques, 1929, p. 80–81, Crop Year 1928–29.

[20] Statesman's Yearbook, 1930, p. 903.

[21] Delelee-Desloges, J. G.: Madagascar Et Dependances, Paris, 1931, p. 226–7.

[22] Official Yearbook of the Union of South Africa, 1929–30, p. 1057.

[23] The South and East African Yearbook and Guide, Browne, A. S. and G. G. Browne, 1928, p. 155.

[24] British Colonial Report, No. 1438, Bechuanaland Protectorate Report for 1928, p. 21.

[25] Census of Swaziland—Swaziland Administration, May 3, 1921, p. 17.

[26] Official Yearbook of the Union of South Africa, 1927–28, p. 460. Figures given in morgen computed at 1 morgen equals 2.11654 acres. Figures for acreage under cultivation are for the year 1926.

[27] Report of the Agricultural and Pastoral Production of the Union of South Africa, 1926–27, Agricultural Census No. 10, Union of South Africa, Office of Census and Statistics, 1927, p. 27.

[27a] Ibid No. 9, 1925–26, p. 83 and 85.

[28] Official Yearbook of the Union of South Africa, No. 12, 1929–30, p. 415.

[29] Ibid p. 992.

[30] Report of the Union of South Africa to the Council of the League of Nations, concerning the administration of South west Africa, 1928, p. 46. Land taken up between 1920–28, probably all European.

[31] Ibid, p. 43 and 47.

[32] Principal crops not given in acres but as follows: wheat 3,621 bags; maize 72,553 bags; potatoes 8,248 bags; Kaffir corn 2,831 bags; tobacco 10,400 pounds; sunflower seed 105 bags; onions 700 bags; beans 376 bags; citrus 280 cases.

[33] Trade Information Bulletin, No. 254—Portuguese West Africa, the United States Department of Commerce, August 11, 1924, p. 11–12.

[34] Rapport Annual Sur L'Administration de la Colonie du Congo Belge, Chambre Des Representants Pendant L'Annee, 1929, p. 55.

[35] French Possessions in Tropical Africa—Trade Information Bulletin No. 239. United States Department of Commerce, 1924, p. 22. See also Maigret, J.: Afrique Equatoriale Francaise, Paris, 1931, p. 182–4, and Vassal, Gabrielle M.: Life in French Congo, London, 1925, p. 126–. Both of these references speak of large concessions but no definite data are included.

[36] International Yearbook of Agricultural Statistics, 1929–30, p. 186. Schwarz, L. J.: Cocoa in West Africa, Department Comp Trade Promotion Series, No. 68, 1928, p. 42. "Fernando Poo produces only plantation cocoa, but that which is exported from Spanish Guinea is native prepared."

[37] Chazelas, Victor (Administrateur en chef des Colonies), Territoires Africains Sous Mandat De La France Cameroun Et Togo, Paris, 1931, p. 155–6.

[38] Report of His Majesty's Government in the United Kingdom . . . To the Council of the League of Nations on the Administration of the Cameroons Under British Mandate for the Year 1929, p. 93–95. Crop yields are for Victorian Division only with twenty plantations, total cultivation 45,064, occupancy 194,575. In Kumba District there are twenty-six plantations but acreage not available.

[39] Blue Book Colony and Protectorate of Nigeria, 1929, Lagos 1930, p. 552.

[40] Report of His Majesty's Government in the United Kingdom . . . to the Council of the League of Nations on the Administration of the British Sphere of Togoland, 1925, p. 83–84. "Land in British Sphere cannot be alienated from a native to a non-native. Lease, however, is permissible . . . subject to approval of the Administration . . . Under the former government, European firms were permitted to purchase lands for trading purposes only."

[41] Chazelas, V.: Territoires Africains Sous Mandat De La France Cameroun et Togo, Paris, 1931, p. 216. Also Guide de la Colonisation au Togo, Commissariat de la Republique Francaise au Togo, Paris, 1926, p. 101.

[42] Bulletin Mensuel de Agency Economique de l'Afrique Occidentale Francaise, May 1930, p. 188.

[43] Ibid., p. 231. Two thousand five hundred and fifty acres are definite concessions, the remainder provisional and are to be devoted to the crops listed.

[44] Gold Coast Colony Blue Book 1929–30; Accra 1930, p. 776.

[45] Annual Report of the Financial Advisor of the Republic of Liberia for the fiscal year 1926–27, p. 13.

[46] Sierra Leone Blue Book for the year ended 31st of December 1929, Freetown, 1930, p. 287 and 289.

[47] Bulletin Mensuel L'Agence Economique De L'Afrique Occidentale Francaise, 1929, p. 87 and 1930, p. 321.

[48] Republica Portuguesa: Annuario Da Provincia Da Guini Do Anno 1925, p. 113.

[49] Colony of the Gambia Blue Book, 1929, p. 179.

[50] Bulletin Mensuel L'Agence Economique De L'Afrique Occidentale Francaise, May 1930, p. 178. European colonization consists of sixteen concessions, five of less than 50 hectares, five of 100 to 500 hectares, two of 500 to 2,000 hectares, and four of more than 2,000 hectares.

[51] Statesman's Yearbook 1930, p. 1289.

[52] Ibid., p. 1102. European colonization confined almost entirely to towns but spreading from Villa Sanjarjo into the fertile Guis Valley.

[53] Annuarie de Statistique Generale du Maroc Annee 1929, p. 207, 194, 180–190. The following number of trees are listed: olive trees, 250,625; citrus trees, 53,108; almond, 29,615; date, 19,911; figs and others, 143,559; vines (native), 354,977; vines (European), 6,145 hectares.

[54] Annuarie de Statistique de L'Algerie, 1929, p. 124–162. Also 675,684 hectares of vines in bearing both European and native. Europeans have 1,724,232 wild olive trees, 3,133,152 cultivated olive trees in bearing. The total of cultivated olive trees is 3,988,927. Date trees total 214,129, of which 183,158 are bearing. The figures for acreage under cultivation are for twenty crops only.

[55] Statistique Generale de la Tunisia 1927, p. 444–458 and 242–243. Figures for area under cultivation incomplete.

[56] Annuarie du Gouvernement General De L'Afrique Occidentale Francais, 1922, p. 119.

[57] Bulletin Mensuel L'Agence Economique De L'Afrique Occidentale Francais, 1930, p. 321. These are concessions apparently for this year only, data on total concessions not available.

[58] Ibid., p. 67. Area of land cultivated in five principal farms in the Sudan in 1929—2,777 acres.

[59] Many concessions to other possessions noted in Bulletin Mensuel De L'Agence Economique De L'Afrique Occidentale Francais, but none found in Niger or Mauritania.

[60] Annuario Statistico Italiano, Anno 1931, IX, p. 568.

[61] Ministero de la Colonie: Le Colonie Italiane Di Diretto Dominio, Anno 1929, p. 29.

Total recorded acres of occupation	293,214,803
Total recorded acres under cultivation	16,065,617

PRINCIPAL CROPS IN ACRES

Maize	5,859,798	Peas and Beans	244,547	Cotton	95,889
Wheat	2,609,781	Coffee	220,561	Cacao	92,877
Oats	1,173,176	Sisal	189,596	Oil Palm	53,593
Barley	622,206	Lucerne	179,906	Rubber	35,072
Kaffir Corn and Millet	385,574	Coconuts	151,130	Pineapple	31,194
Sugar Cane	288,663	Rye	138,155	Tea	18,219
Orchards and Vineyards	279,667	Tobacco	112,388	Bananas	15,650
Teff	264,707	Potatoes	105,935	Groundnuts	9,905

EXPLORATION AND RACES

A great wave of exploration opened the interior of Africa in the later half of the nineteenth century. Barth, Rohlfs, Vogel, and many others pushed into the Sahara and the Sudan; Livingston, Serpa Pinto, Capello and Ives, Cameron, Pogge, and others into South Africa; Burton, Speke, Baker, Schweinfurth, Nachtigal, Stanley, Emin Bei, and many others into East and Central Africa.

Important from an agricultural point of view is the anthropological development of the continent. The original inhabitants, a mixture of peoples ranging from the Negrito through the Negro, and Hamitic races, were invaded in the north and east by Semitic peoples which still further mixed the populations of the east coast and the portion north of the equator. Likewise the Caucasian races have influenced to a marked degree the population of North and South Africa.

A discussion of the agricultural regions of Africa must be based largely on the agriculture of the Bantu peoples in the south, the Hamitic people in East Africa, the Fulbe and Nilotic Negroes in the Sudan, and the Berber Arabic groups of the north.

FIGURE 2.—Land prepared for planting. Intensive cultivation and hand irrigation by a shadoof is practiced in Egypt. Luxor, Egypt.

FIGURE 3.—A field of maize and sesame (simsim), both in hills. Shikaba, Anglo-Egyptian Sudan.

The European, except in South Africa and North Africa, has not yet modified the agricultural pattern of the native races.

Africa is the last of the important continents to become a part of the commercial world. It is still looked upon as a source of such commodities as cloves, gums, raisins, hides, skins, grains, cotton, vegetable oils, and ivory. In the north are the great small-grain fields of Algeria, Morocco, and Tunis. In the south the grain fields of Cape Province and the maize lands of Orange Free State and the Transvaal. But the importance of African agriculture is not primarily in its export of foods, but in feeding its own great native population. It is self-sustained in great part.

The Nile Valley and Mediterranean culture did not influence the agricultural practices of Central Africa. The use of draft animals and the cultivation of soil by means of a plow (Figure 8) did not extend south of Ethiopia (Figure 7) and the Sud region of the Nile. South of this line stock raising and the intensive cultivation of the soil with the hoe (Figure 6) were the only means employed to gain a return from the soil. The more dominant races relied mostly on cattle or other livestock and the cultivation of the soil was reserved to subjugated races. In this way the higher grassland areas of Central, East, and

South Africa were occupied by warlike stock-raising peoples. The weaker races, judged only on the basis of ability to wage war, were driven into less desirable places from the standpoint of livestock, such as the forested mountains and lowlands. Here cattle were shut out by tsetse flies and by unfavorable natural vegetation.

The distribution of people was not so closely correlated with the ability of the country to produce as would naturally be expected, due to inter-tribal wars and the slave trade. Slavery was so natural a development in Africa and so naturally grew out of a combination of a feeling of social superiority and the desire to spread Christianity and Mohammedanism, that it is not at all surprising that man was more openly exploited in Africa than in any other continent. There was probably more direct brutality there than in any other continent. Even under more recent European influence, the African has been subjected to a warfare more brutal than even that of the dark ages, and our system of taxation and recruiting of labor has in places produced effects almost in line with the effects of the slave trade.

FIGURE 4.—A waterwheel for irrigating agricultural land. Khartoum, Anglo-Egyptian Sudan.

FIGURE 5.—Grain sorghum planted after the subsidence of flood water. Khartoum, Anglo-Egyptian Sudan.

Notwithstanding the entire subjugation to European rule, the African has by weight of numbers held largely to his original customs and methods of agricultural production. Agriculture is so much a part of the soil and the physical environment that it cannot be as easily displaced as can the less basic industries. Even in America where we imported the people and European crops and methods of cultivation our agriculture still remains largely that of the American Indian, and although many of the processes are carried on by highly developed modern power machinery the methods of planting and the crops themselves were taken directly from the native practices. So, in Africa, the production of food for man and beast when one looks at the continent from a distance is largely by methods developed by the Bantu and other native races (Figure 2). The word Bantu denotes a linguistic group composed of over 500 dialects used by an Ethnic mixture ranging through Negrito, Negro, Hamitic, Semitic, and even Caucasian races.

Although many of the highlands of central Africa have a comparatively healthful climate they were shut off by malarial lowlands. This probably accounts for the retention of these areas by cattle-raising tribes since the whites who reached these highlands were already infected with malaria, and there-

fore, regarded this portion also as unhealthful.

Portugal tried bravely to colonize Angola and for centuries continued to bury hundreds of thousands of their people in this colony. Not until the wave of settlement carried European colonists to the New World was South Africa settled by the Dutch. The Union of South Africa (U. S. A.) was settled at about the same time the United States of America (U. S. A.) was settled. The people, thrifty and very devout, were much alike. South Africa, colonized by the Dutch under Jan Von Riebeck in 1651 and taken by the British in 1806, resembles southern California more than any other part of the United States in its type of agriculture and general climate. Although the Dutch and English have developed agriculture and horticulture to a high degree of modern perfection, South Africa still has a large population of Bantu, Hottentot, and Bushmen peoples, and derivatives from these races. On these races European agriculture relies for most of its farm labor, and to quite an extent is affected by the natural agricultural tendencies of these native peoples.

FIGURE 6.—Native woman with a hoe. The bulk of central Africa land cultivation is with the hoe. Nyanza, Urundi.

FIGURE 7.—Ethiopian plow with yoke attached. Excellent for stony ground. Land is plowed and seed covered at the same time. Addis Ababa, Ethiopia.

Tropical Africa is only now being developed by an occasional big plantation intrusion of moneyed European or American companies. To a great extent the native has been encouraged directly or indirectly to produce crops for sale and export, but tropical Africa, except in a few spots, is not much affected by European methods and practices in agriculture.

VARIATION IN CLIMATE

As a continent there is great variation in moisture supply. The dry deserts of the north, the east, and the southwest are so extreme that even grazing is possible only after rains or in more favored locations, and the precipitation falls to as low as one inch a year. Over a third of the land area of the continent has less than ten inches of yearly rainfall (Figure 1). Contrast with this the condition on the coast region of the Cameroons where the rainfall exceeds 400 inches a year. Only about one-fifth of the land area has a rainfall in excess

of 50 inches a year. The center of heaviest rainfall is in the Cameroons and the coast of Liberia and Sierra Leone. From these centers vegetation and agriculture can easily be ranged in concentric zones leading out through conditions less and less favorable for plant growth until true desert conditions are reached.

The conditions of temperature are tropical or subtropical. Only at high elevation in the south and the north is frost a factor. In the north and south subtropical agriculture and citrus and other fruits which withstand light frost succeed. The mountains of the Mediterranean and of South Africa are strictly temperate. Much of the high mountainous plateau country of Central or tropical Africa has a truly temperate climate where the temperature ranges from 65 to 85 degrees Fahrenheit, and where temperate crops thrive, and also cool-weather tropical crops. The temperature is favorable for peach, pear, apple, coffee, banana, and citrus; for oats, wheat and flax, maize, sorghum, pennisetum, raga, and where yams, cassava, and sweet and Irish potatoes grow together. In other words, where extremes of heat and cold are unknown.

AFRICA SELF CONTAINED

Except where European agriculture has been established or where European supervision and taxation has forced a money crop, Africa is usually self-contained and offers little or nothing for export. Food and other commodities are produced and used locally. On this local production the greater part of the 126 million natives rely. A very small amount of their food is imported, and much of it is harvested from their gardens as it is needed and is never stored. Some of the vegetables may be dried and dry grains and legumes stored for short periods. Moreover, the fields are often not harvested in the sense that Europeans harvest a crop. Melons, sweet potatoes, yams, bananas, and many other crops are used by taking a fruit or a root without greatly disturbing the growing plant or clump of plants. The plantings are mixed in age of plant and kind of plant (Figures 3, 16, and 57). Many kinds of plants and plants of all ages are grown in the same plot at the same time. The owner can pick from this patch food for each meal, and must carefully plan the growing crop so that there are no periods

FIGURE 8.—Plowing with two cows. Luxor, Egypt.

when the food supply is lacking. It would be impossible to measure by any statistical method based on harvested crop or stored or sold crop the total amount or value of the agricultural production of Africa. Some idea can be obtained by estimating the amount of food produced in such regions as Uganda and Kenya where careful census figures are available, and applying these figures to the populations of other countries. But these must be regarded only as approximations. Approximations, however, are better than mere guesses, and probably guesses, if they are always so regarded and are based on some knowledge of the country, are better than no guesses at all.

PHYSICAL CONDITIONS

Physical conditions to a great degree determine the productive areas of Africa. In the extreme desert areas, irrigation (Figure 4), floodwater, river flooding, and subirrigation, produce areas of high productive capacity. By taking advantage of seasonal rains and flood water (Figure 5), grain crops of sorghum and barley are grown, often by nomadic peoples. In fact, the agriculture of the Nile valley (Figure 13), was of this type originally since normal flooding was relied upon to moisten the soil for the crop. But such or similar practices can be used in many depressions, provided, of course, that they are not marked by saline deposits. This practice succeeds in regions varying as low as 5 to 10 inches of rain a year and the crop usually has to be matured as a result of one thorough wetting. The natives have adapted their methods to the physical environment in a degree approximating the agricultural practices of the Hopi in Arizona.

FIGURE 9.—Native hut in a field of manioc. M'Sala, Urundi.

FIGURE 10.—A termite hill cleared of trees and planted to maize. The field is not over fifteen yards across. Kafue, Northern Rhodesia.

Production without some form of irrigation is limited largely to regions approximating 20 inches of rain per year or over. The great small-grain belts and the greatest areas for sorghum and millet development lie in the rainfall belt of 18 to 40 inches per year. Rainfall in excess of 50 inches per year characterizes the rich tropical rice, banana, oil palm, and yam producing areas. A rainless period at the time of harvest is important for such crops as sorghums, millet, small-grains, and cotton. Maize, cassava, bananas, and yams are not ripened for use and can be taken from plants which are growing rapidly at the

time since much of the maize is eaten as green corn.

The presence in East Africa of a mountainous plateau, with "inselberg" and two great rift valleys cutting through it, gives great local variation in rainfall, natural vegetation, and crop production. Often a mountain will be a drought desert on the lee side and on the side toward the advancing air masses a temperate rain forest more luxuriant and dense than even the tropical lowlands. Here are soils not old but young and rich, but which would, because of the steep slopes, be impossible of cultivation by European methods. With the hoe these mountain sides become the most productive portions of the continent. Here populations are dense and in places there is little waste land. Level lands which have been long in place under high rainfall in the tropics are leached and hydrolized and are usually lateritic and relatively unproductive. This is not true of the soils of the mountain sides.

FIGURE 11.—A grain sorghum market. Omdurman, Anglo-Egyptian Sudan.

THE HOE

Only a small portion of Africa was influenced by the plow. The Mediterranean countries, Egypt (Figure 8), and the Ethiopian highlands (Figure 7), mark the area where the plow was used. South of this line the plow was unknown and the people being freed of the "Tyranny of the Plow" were able to use the land to much better advantage and limit cultivation to the richer soils. Here were the mixed races of the Fulbe, the Nilotic Negroes, the mostly pastoral Hamitic races of East Africa, and the Bantu and Hottentots.

FIGURE 12.—Grain sorghum stored without shelter or protection from birds. Shaded to some extent by date palms. Khartoum, Anglo-Egyptian Sudan.

Rough and uneven land, small areas between trees or rocks, partially cleared land, isolated natural levees along swampy rivers, termite hills, soil exposed by a fallen tree, or any other small area could be advantageously cultivated with

FIGURE 13.—Dates and limes. Khartoum, Anglo-Egyptian Sudan.

the hoe. The tropical rain forest, difficult to clear, could be thinned out and crops grown between the large trees and in the slash timber. This could be only slowly removed from the land by burning. Cultivation of such an area with the plow would be almost impossible. The rectangular patch or long strip is absent in hoe culture and much greater opportunity is given to choose the productive land and avoid the unproductive. Hoe culture (Figure 6) also offers much better opportunities to practice mixed culture when six or a dozen different crops are grown together and where all stages of plant development from seeding to mature plant are found growing in the same plot.

FIGURE 14.—Native granaries and hut with cooking stones in foreground. M'Gora, Uganda.

As one travels through the country one is impressed with the sudden changes in type of crop grown. Sometimes it is a change from humid climate crop to drought type, but often there is no physical basis for the sudden change. These changes would seem to indicate recent migrations. A highly specialized type of cultivation developed through centuries of time would not easily be changed by migrating peoples. Careful study and classification of agricultural practices should throw light on the probably original home of any of these races in which agricultural practice is somewhat out of adjustment with the local soil and climatic conditions. In the United States the eastern or mid-western farmer failed at first to consider properly the moisture limitations to crop production on the high plains. North Europeans carried stone fences and buildings and small grain culture into the cotton-belt of Texas. In Africa there should be many cases of this kind. Pennisetum, yams, and eleusine seem to appear suddenly without any special reason and in many places they are absent where they would naturally be found. Such American crops as cassava and corn have a greater uniformity of distribution than many of the indigenous crops.

The food habits of the tribes differ markedly. In Uganda for example, banana is a staple crop and at times almost excludes other crops (Figure 53). Across the lake the Kavarondo rely much more on sorghum, while the Masai rely exclusively on blood and milk.

Where a tribe has migrated it may have carried with it into a new country food habits which cannot easily be changed. Beans in places are an important part of the diet and in other places where they would grow just as well they are seldom seen. As a rule fats and oils are in demand. Sesame and groundnuts will grow in maize, sorghum, and millet country and form an important addition to the maize, sorghum, or millet diet. In the Congo and on the west coast the oil palm furnishes in the pericarp and in the kernel a good supply of vegetable oil.

On the better grasslands along the desert areas or on the high plateaus of the tropics, cattle and sheep are produced by nomadic or in the highlands by non-nomadic peoples. A map of the grasslands would correlate very closely with the pastoral peoples, and many of these tribes rely almost exclusively on their cattle for food products.

But the coast peoples, the inhabitants of the forested mountain areas, the tropical rain forest, and the high-grass savannas rely on intensive cultivation of truck crops and grains, and on goats and chickens. They would be unable to maintain themselves against the more aggressive and warlike pastoral tribes if the land were suitable to support the flocks of the latter.

TABLE II

DOMESTIC ANIMALS, EUROPEAN OWNED

Country and Possession	*Date*	*Ostriches*	*Cattle*	*Goats*	*Sheep*	*Pigs*	*Horses*	*Mules*	*Donkeys*	*Camels*
North East Africa										
Ethiopia	None (?)									
Somaliland (French)	None (?)									
Somaliland Protectorate (British)	None (?)	See Table I, note 3								
Eritrea (Italian)	None (?)									
Somaliland (Italian)	None (?)									
Egypt	None (?)									
Anglo-Egyptian Sudan (British and Egyptian)	None (?)									
East Africa										
Uganda Protectorate (British)	1925[1]		1,550	201	98	109		7	17	
Kenya Colony and Protectorate (British)	1929[2]		218,390	3,926	235,498	17,746	2,288	632	1,235	
Zanzibar Protectorate (British)	None (?)									
Tanganyika Territory (British Mandate)	Native and European, not listed separately.						See Table IV			
Urundi and Ruanda (Belgian Mandate)	None (?)									
Nyasaland Protectorate (British)	1929[3]		20,245	484	1,339	942	6	3	211	
Northern Rhodesia (British)	1929[4]		83,861		4,763	3,358	65	19	423	
Southern Rhodesia (British)	1928[5]		905,383	11,707	79,669	21,102	2,541	1,352	10,985	
Portuguese East Africa (Portuguese)	1928[6]		44,257	32,306	5,557	16,938	10	46	442	
Madagascar (French)	None (?)	See Table IV								
South Africa										
Basutoland (British)	1921[7]		6,251	1,101	5,286		1,408	300		
Bechuanaland Protectorate (British)	1921[8]		68,718	10,231	12,268		493		2,278	
Swaziland (British)	1921[9]		63,749	4,642	34,826	1,173	831	208	2,808	
	1928[10]		71,000							
Union of South Africa (British)	1924–5[11]	162,732					654,085	122,000	604,842	
	1928[12]		5,377,895	3,100,556	37,704,917	424,803				
Transvaal	1924[11]	1,664					128,744	16,831	173,366	
	1928[12]		1,767,292	103,853	5,194,043	123,594				
Orange Free State	1924[11]	1,339					242,052	14,950	48,261	
	1928[12]		1,521,151	42,344	11,685,270	76,791				
Natal	1924[11]	517					71,231	9,345	43,617	
	1928[12]		786,900	42,612	2,221,809	51,437				

Country and Possession	*Date*	*Ostriches*	*Cattle*	*Goats*	*Sheep*	*Pigs*	*Horses*	*Mules*	*Donkeys*	*Camels*
Cape of Good Hope	1924[11]	159,212					212,058	80,874	339,598	
	1928[12]		1,302,550	2,911,747	18,603,795	172,981				
South West Africa Mandate	1928[13]		516,864	1,965,908	552,781	10,015	14,038	1,741	36,693	
West Africa										
Angola (Portuguese)	1928[14]	Separate data		not available.	See	Table	IV			
Congo (Belgian)	1929[15]		82,753	10,004	10,244	7,492	427	33	247	
Guinea (Spanish)	None (?)									
Fernando Po (Spanish)	1928[16]		1,492	70	98		35			
French Equatorial Africa	None (?)	See	Table IV							
Cameroons (French Mandate)	Separate	figures	not found.	See Table IV						
Cameroons (British Mandate)	None[17]	See	Table IV							
Nigeria (British)	None (?)	See	Table IV							
Togoland (British Mandate)	None (?)	See	Table IV							
Togoland (French Mandate)	Separate	data	not found.	See Table IV						
Dahomey (French)	None (?)	See	Table IV							
Ivory Coast (French)	None (?)	See	Table IV							
Gold Coast, Ashanti, and Northern Territories (British)	None (?)	See	Table IV							
Liberia	None (?)	See	Table IV							
Sierra Leone Colony and Protectorate (British)	None (?)	See	Table IV							
Guinea (French)	None (?)	See	Table IV							
Guinea (Portuguese)	None (?)	See	Table IV							
Gambia Colony and Protectorate (British)	None (?)	See	Table IV							
Senegal (French)	None (?)	See	Table IV							
North Africa										
Rio de Oro and Adrar (Spanish)	None (?)	See	Table IV							
Ifni (Spanish)	None (?)	See	Table IV							
Morocco (Spanish)	1920[18]	Unimportant								
Morocco (French)	1929[19]		60,967	15,564	130,601	43,173	9,239	7,806	2,972	679
Algeria (French)	1928–9[20]		132,830	87,119	446,637	88,876	48,067	58,808	7,478	569
Tunis (French)	1927[21]		59,319	26,881	89,720	13,466	9,961	11,534	2,277	363
French Sudan Colony (French)	None (?)	See	Table IV							
Territory of the Niger (French)	None (?)	See	Table IV							
Upper Volta (French)	Apparently all native.			See Table IV						
Mauritania (French)	Apparently all native.			See Table IV						
Tripolitania (Italian)	1928	Data	not separate.	See	Table IV					
Cyrenaica (Italian)	1928	Data	not separate.	See	Table IV					
Totals		162,732	7,651,775	5,273,081	39,311,920	649,193	742,887	204,339	673,058	1,611

[1] Annual Report the Department of Agriculture Uganda Protectorate for year ended December 31, 1925.

[2] Colony and Protectorate of Kenya Blue Book for year ended 31st December 1929, Nairobi. Section 22, p. 3–5.

[3] Nyasaland Protectorate—Blue Book for the year ended December 1929, Zomba, 1930, p. V 5.

[4] Northern Rhodesia Blue Book for the year ended 31st December 1929, Livingstone, p. V 3–4.

[5] Official Year Book of the Colony of Southern Rhodesia, 1930, p. 358, 365, 370–371.

[6] International Year Book of Agricultural Statistics, 1929–30, p. 233–253.

[7] Official Year Book of the Union of South Africa and of Besutoland, Bechuanaland Protectorate and Swaziland, Pretoria, 1927, p. 1050.

[8] Ibid., p. 1063.

[9] Swaziland Census, 3rd May 1921, p. 18.

[10] British Colonial Report, No. 1459, Swaziland Report for 1928, p. 5.

[11] Union of South Africa Office of Census and Statistics: Report of the Agricultural and Pastoral Production of the Union of South Africa, 1924–25, Agricultural Census No. 8, 1925, Pretoria, 1929, p. 106. Includes animals on European farms both European and native owned.

[12] Ibid., 1927–28, No. 11, 1928, p. 31–32.

[13] Report of the Union of South Africa to the Council of the League of Nations concerning the administration of Southwest Africa, 1928, p. 45.

[14] Great Britain Department of Overseas Trade—Economic Conditions in Angola, February 1929. "Certain British interests have obtained large concessions in Angola for the purpose of breeding cattle. It is understood that a South African capitalist is seeking similar concessions."

[15] Rapport Annuel Sur L'Administration de la Colonie du Congo Belge Pendant L'Annee, 1929, p. 55.

[16] International Year Book of Agricultural Statistics, 1929–30, p. 233–249.

[17] Report by His Britannic Majesty's Government to the Council of the League of Nations on the Administration of the British Camerouns for the year 1926, London, 1927.

[18] Statesman's Year Book, 1930, p. 1102, states that European colonization is as yet confined chiefly to the towns.

[19] Annuarie de Statistique Generale du Maroc,Annee 1929, p. 192–3.

[20] Annuarie Statistique de l Algerie, 1929, p. 164–168.

[21] Statistique Generale de la Tunisie 1929, p. 246–7.

RELIGION AND AGRICULTURE

The religious pattern effects agriculture to some extent. Certain tribes will not eat eggs and chicken, and the Mohammedans shut out the hog from areas which they control. The Mohammedan influence is felt far beyond the zone which they dominate. This influence is felt north and east of a line (Figure 65) which extends from south of the mouth of the Zambezi north along the west side of Lake Nyasa, then west to beyond the Lualaba, down the Lualaba and Congo to the mouth of the Ariwini, then north across the Welle following the Shari to about 10 degrees north latitude then south and west to about 500 miles from the coast at the Cameroons, and west at about that distance from the coast to the Atlantic Ocean north of Sierra Leone.

FIGURE 15.—Granaries in which the government requires grain to be deposited from season to season to insure against starvation after crop failures. It is weighed on the frame at the left. Masindi, Uganda.

LAND POLICY

The land policy is important in considering African agriculture. Land tenure is placed in the tribe and there is not a close correlation between the amount of land held by a tribe and the amount actually pastured or cultivated. Tribal headquarters may be moved about, land first cultivated, then abandoned and much of it left in a natural state and used for grazing and hunting.

The right to use the land is allotted by the chief and the individual would no more think of claiming rights to the land than he would to the rainfall or the sunshine. Land is usually assigned to the wife, who, after it is cleared and broken by the men, plants, cares for, and harvests the crop. The introduction of money crops has induced the men to enter the field of agricultural labor. But, to have a large amount of land to cultivate, a man must have many wives, for polygamy is part and parcel of the African economic system.

The one great fear which is outstanding among native peoples of Africa is that the "white man will eat up his land." On the native system the

European has been most effective in establishing title to the raw lands. A protectorate lays no claim to land but the change to a crown colony places in the possession of the crown all lands not definitely assigned. There are no essential differences in the ultimate results dependent on the nationality of the power concerned.

A conference of the governors of the East African dependencies in 1926 divies native lands as follows:

> "First there are those lands which as jungle, or forest or desert or swamp or because of the inroads of human and animal disease or for other causes were indubitably unoccupied and unclaimed at the time when our government was established.
>
> "Secondly there are those lands to which there was only a doubtful claim, the 'lands of the spear,' where the cattle of hostile tribes grazed under warrior guard whenever grazing was scarce at home.
>
> "Thirdly, there are the lands effectively occupied by a large and settled native population.
>
> "This third category of land should clearly be reserved to its original native owners. On the other two, sufficient land for their own use should be secured to the native tribes originally sprinkled or wandering over it, but the rest is clearly the property of our government, to develop in the manner which it considers most suitable."
>
> (Report of the Commission on Closer Union of the Dependencies in Eastern and Central Africa 1926, page 333.)

It is clear that this policy applied universally over the earth by European peoples does not permit a native of Africa to follow his system of agriculture which consists of continually seeking new areas as soon as the productivity of the old land is lowered, and abandoning the old to be reclaimed again by natural processes.

While there are many complications which cannot be taken up here, it is safe to state that the land problem is difficult for any European nation to solve. The European and African systems are so different that a compromise is almost out of the question, and if the European is to direct he will have to follow his point of view however detrimental it may be to African culture. Even in the mandated territory this problem becomes extremely difficult. To regard the land as the property of the tribe, to allow the chief to manage it as such, does not permit the exploitation and development such as modern nations demand of their own lands or those of their colonies and assigned mandates.

FIGURE 16.—Native field of rice, maize, manioc, and banana. The forest is only partly cut down. Banana will hold the land until it is abandoned to revert again to forest. Kindu, Belgian Congo.

The mandates were set up on a very different basis than the colonies. In the former the rights of the indigenous peoples are to be given first consideration, while in the latter the area is looked upon as an outlet for men and capital from the mother country. That the mandates will develop as planned in view of recent aggression in Africa is doubtful. An ideal set-up by the forces which backed a League of Nations could not fail to be weakened by the permitted aggression of stronger nations against the weaker. Ethiopia, the only free nation in Africa, was assured independence jointly by France, Italy, and Great Britain in 1906. Now no native people except those in the mandates are given first consideration and the

quotations above point clearly to a condition which will take from them the land which under their system is necessary to their continued success.

The mandate system is a gesture on the part of the civilized to deal honestly and generously with the uncivilized. In this gesture, except in its inception, America has had no part and has done nothing to carry through the plan.

LAND CULTIVATED BY NATIVES

The amount of land cultivated per native varies greatly. In Uganda it is about 0.9 acres, and consists largely of bananas, while in southern Rhodesia where sorghum and vegetables are grown it amounts to about 1.5 acres. At this rate the 126,000,000 natives in Africa would require 150,000,000 acres of land. This would indicate that the records

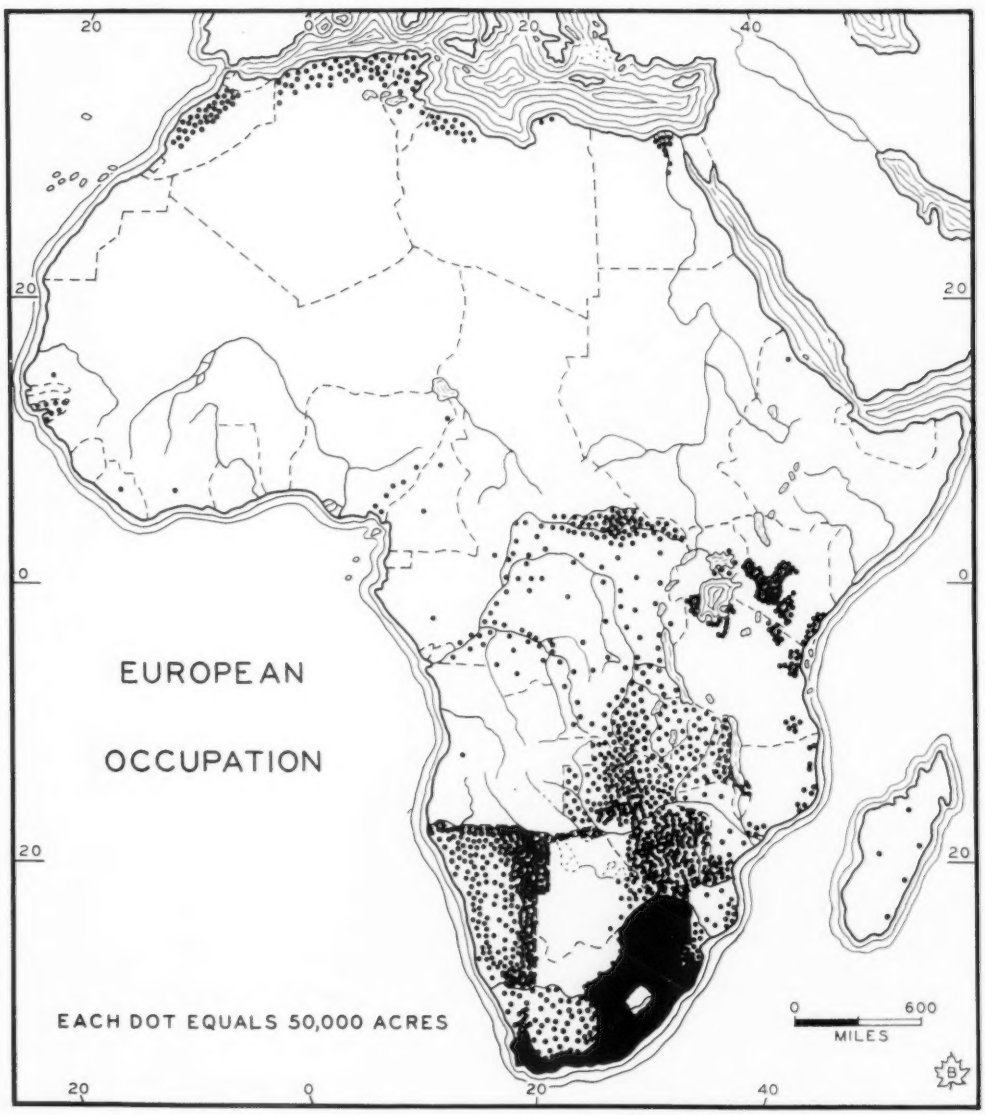

FIGURE 17.—Over three-fourths of the European owned land of Africa is in the Union of South Africa, about one-fifth in the tropical area, and one per cent along the Mediterranean.

we have obtained in Table III contain only about 55 per cent of the total.

Since so many of the countries have no data in the table on the amount of land cultivated by natives, this figure is probably approximately right. In other words, to the 84,000,000 acres here recorded (Table III) there should be added about 67,000,000 acres which, although used, are not available in any reliable record, and that the total area used by native Africans is probably about 150,000,000 acres. In other words, the natives are cultivating about 2.1 per cent of the total area, or if we consider only land capable of crop production (Table VIII) about 3.8 per cent of the

FIGURE 18.—Soil ridged up and planted to manioc, beans, groundnuts, maize, and rice, with mango trees in the background. Tabora, Tanganyika.

area. The Europeans (Table I) have occupied 4 per cent of the area and cultivated 0.2 per cent, or if we consider only land capable of crop production, they have occupied about 7.3 per cent and have cultivated only 0.4 per cent or about 5.5 per cent of the land they have occupied.

That one-tenth of the productive land of Africa is used for crop by natives or occupied by Europeans does not mean that the remaining land is not needed as pasture land and hunting land. In the United States, for example, in 1930 only about 19 per cent of the land was under cultivation. In Africa usually everyone in the family works on the land. The men must cut the forest and

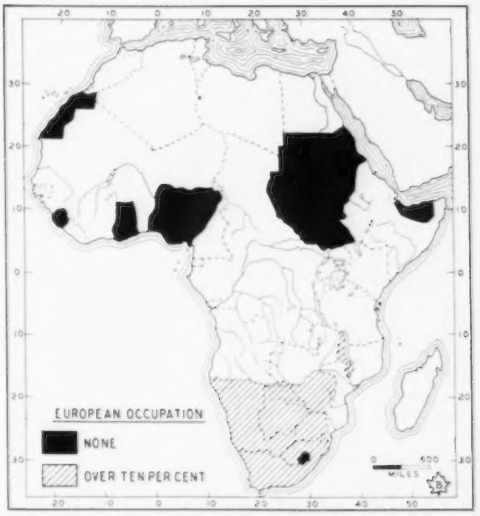

FIGURE 19.—The area occupied by Europeans should probably include Algeria if figures were available. It includes principally cool-weather crop land. The areas of no European occupation lie for the most part north of the equator and indicate land that is not undesirable for European use but which has been held by African occupation. In the south it includes Basutoland only.

prepare the land for its first crop. The women and children plant, care for, and harvest the crop. Men have undertaken the planting, cultivation, and harvest of money crops.

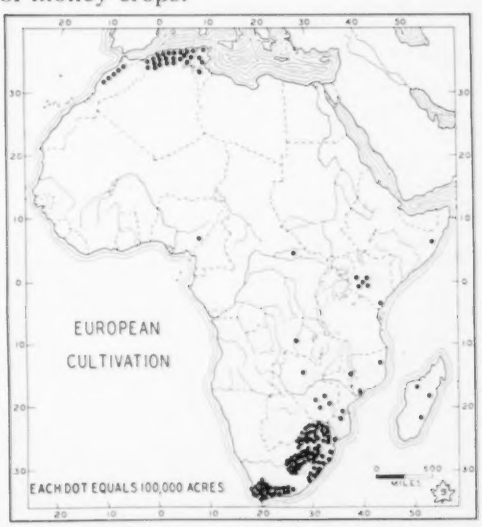

FIGURE 20.—The Union of South Africa has two-thirds of the cultivated land. A small amount in the temperate portions of tropical Africa and in Algeria and Morocco indicate how small is the place of European agriculture over much of the continent.

TABLE III

RECORD OF NATIVE CROP PRODUCTION

Country and Possession	*Date*	*Total Acreage*	*Acres in Principal Crops in Order of Importance*
North East Africa			
Ethiopia		20,000,000[1]	Barley, wheat, teff, oats, temperate fruits and vegetables, sorghum, cotton, maize, coffee
Somaliland (French)	1920–30[2]	Not available	Dates, coconuts, fruits, legumes (order and area not known)
Somaliland Protectorate (British)	1931[3]	80,000	Sorghum, maize, grain
Eritrea (Italian)	1928[4]	97,202	Barley 42,000, wheat 24,710, maize 12,355, linseed 11,119, cotton 6,178, potatoes 494, coffee 346
Somaliland (Italian)	1928[5]	63,202	Maize 31,035, cotton (irrigated crop only) 20,385, sesame 11,243, sugar cane 1,235. [6]Also dura, papaya, bananas, grano turco, sesame, kidney beans, cotton, sugar cane, kapok, tobacco, castor oil
Egypt	1928–29[7]	5,765,182	Maize 2,131,378, cotton 1,804,534, wheat 1,589,874, beans 530,649, barley 366,247, rice 264,215
Anglo-Egyptian Sudan (British and Egyptian)	1928[8]	2,574,481	Dura 1,603,543, dukhn 388,129, cotton 267,819, sesame 97,627, groundnuts 48,730, wheat 27,443, maize 20,612, barley 10,374, beans 4,874
East Africa			
Uganda Protectorate (British)	1929[9]	3,823,464	Bananas 808,308, cotton 681,860, millet 639,128, sweet potatoes 427,420, sorghum 264,247, manioc 219,495, simsim 214,370, beans 192,915, maize 130,994, peas 109,828, groundnuts 83,563, rice 21,831, coffee 16,388, sugar cane 3,926, tobacco 3,464, potatoes 2,522, chilli 1,459, rubber (para) 247, wheat 172, miscellaneous 1,330
Kenya Colony and Protectorate (British)	1930[10]	1,854,280	Sorghum and millet 541,980, maize 386,310, pulse 305,414, roots 180,865, bananas 50,731, simsim 48,459, coconuts 28,965, sugar cane 21,870, wattle 20,859, groundnuts 13,077, cotton 11,816, vegetables 1,996, wheat 914, other crops 16,187
Zanzibar Protectorate (British)	1929[11]	387,000	Coconuts 55,000, cloves 48,000, other crops 275,000
Tanganyika Territory (British Mandate)	1929[12]	4,231,666	Millet 1,323,895, maize 538,486, beans and peas 352,660, bananas 218,650, sisal 178,966, manioc 135,814, cotton 107,700, rice 102,390, sweet potatoes 99,536, coffee 77,798, groundnuts 59,415, simsim 52,340, coconuts 45,280, copra 39,700, sugar cane 24,500, rubber 20,000, wheat 13,320, tobacco 5,150, potatoes 3,360, kapok 3,100, oil palm 1,000, pumpkins 700, chilli 5, unallotted (mostly food crops) 827,900
Urundi and Ruanda (Belgian Mandate)	1929[13]	Not available	Beans, peas, sweet potatoes, bananas, sorghum, eleusine. Less important: maize, manioc, oil palm, groundnuts, colocasia, yams, pumpkins, rice, sugar cane, wheat, potatoes, tobacco, castor oil seeds, coffee, cotton
Nyasaland Protectorate (British)	1926[14]	Not available (54,000)	Cotton 38,000, tobacco 16,000 [15]Food crops: maize, groundnuts, rice, wheat, beans, and various crops
Northern Rhodesia (British)	1929[16]	Not available	
Southern Rhodesia (British)	1929[17]	1,365,738	Cereals, millet, sorghum, maize, rice, cowpeas, peanuts, sweet potatoes and yams, pumpkins and melons, manioc, sweet cane, fruits
Portuguese East Africa (Portuguese)	1926[18]	Not available	Maize, millet, groundnuts, sweet potatoes, beans, rice, manioc, tobacco
	1931[19]		Groundnuts, maize, beans, manioc
Madagascar (French)	1928[20]	3,590,000	Rice 1,273,000, manioc 782,000, maize 194,000, vanilla 53,000, coffee 49,000, potatoes 44,000, cloves 33,000, tobacco 16,000

Country and Possession	*Date*	*Total Acreage*	*Acres in Principal Crops in Order of Importance*
South Africa			
Basutoland (British)	1921[21]	Not available	Wheat, maize, Kaffir corn, beans, pumpkins and melons
Bechuanaland Protectorate (British)	1921[22]	Not available	Kaffir corn, maize, beans, pumpkins and melons
Swaziland (British)	1921[23]	Not available	Maize, Kaffir corn, fruits and vegetables
Union of South Africa (British)	1927[24]	Not available	(Short tons) Maize 428,053, Kaffir corn 97,610, groundnuts 5,662, potatoes 3,561 (Pounds) Tobacco 1,487,387
Transvaal			
Orange Free State			
Natal			
Cape of Good Hope			
South West Africa (Mandate)	1928[25]	Not available	
West Africa			
Angola (Portuguese)	1928[26]	Not available (516,525)	Maize 402,857, coffee 62,519, wheat 16,689, cotton 11,857, tobacco 9,978, sesame 4,421, sugar cane 4,193, rice 2,864, groundnuts 1,147
Congo (Belgian)	1929[27]	4,287,044	Manioc 1,427,739, maize 607,812, bananas and plantain 506,688, oil palm 396,633, cotton 313,832, beans 211,888, groundnuts 209,145, sweet potatoes 158,080, rice 142,577, millet 81,716, sorghum 71,155
French Equatorial Africa (French)	1927[28]	Not available (312,070)	Groundnuts 177,067, maize 68,694, sesame 22,980, tobacco 15,864, coffee 14,740, cacao 9,513, rice 3,212
Guinea (Rio Muni) (Spanish)	1927[29]	Not available	Cacao 1,235 [29] Grown but not commercially: oil palm, yams, manioc, rubber, copra, bananas
Fernando Po (Spanish)	1920[31]	Not available	Cacao 58,068 (native and European) [30] Grown but not commercially: oil palm, yams, manioc, potatoes (at high elevations), rubber, copra, bananas
Cameroons (French Mandate)	1928[32]	Not available (64,740)	Groundnuts 44,478, cacao 17,544, sesame 2,718. Also nut palms, rubber
Cameroons (British Mandate)	1928[33]	Not available	Chief crops: millet, sorghum, cotton, groundnuts, manioc, sweet potatoes, onions, beans, maize, yams, rice, wheat, tobacco, colocasia, simsim, vegetables and fruits; cacao is being developed
Nigeria (British)	1929[34]	Not available	Exports only, in tons: palm kernels, 251,477, groundnuts 144,379, palm oil 131,845, cacao 55,236, cottonseed 8,327, shea nuts 6,748, benniseed 6,373, cotton lint 5,865, rubber 2,111, piassava fiber 315, copra 133, shea butter 103, gum Arabic 79, maize 72, colanuts. Principal food crops in north: guinea-corn, millet, rice, groundnuts, yams, sweet potatoes, fra-fra, potatoes, colocasia, beans, groundbeans, cowpeas, pigeon-peas, okra, peppers; and in south: manioc instead of yams, maize instead of other cereals
Togoland (British Mandate)	1925[35]	Not available	
Togoland (French Mandate)	1926[36]	Not available (34,989)	Cotton 34,594, groundnuts 395
Dahomey (French)	1929[37]	Not available (189,253)	Cotton 108,427, groundnuts 80,826 [38] Food crops: millet, yams, manioc, beans
Ivory Coast (French)	1928[39]	Not available (470,034)	Rice 203,166, cotton 148,260, cacao 98,840, coffee 17,297, groundnuts 2,471 [40] Food crops: manioc, rice, bananas, maize, sweet potatoes
Gold Coast, Ashanti, and Northern Territories (British)	1929[41]	Not available	Exports, in tons: cacao 200,913, palm kernels 5,743, colanuts 3,108, copra 1,158, oil palm 487, rubber 333, sisal 289 [42] Cacao 904,386 Crops grown for local consumption are chiefly maize, yams, manioc, colocasia, sweet potatoes, groundnuts, bananas, rice, tobacco, coffee
Liberia	1927[43]	Not available	Rice, manioc, yams, bananas, Indian corn, maize, beans, groundnuts, sweet potatoes, sugar cane

Country and Possession	*Date*	*Total Acreage*	*Acres in Principal Crops in Order of Importance*
Sierra Leone Colony and Protectorate (British)	1929[44]	Not available (11,930)	Cacao 5,000 to 6,000. Crops of large area (no statistics): rice, manioc, ginger, cola. Crop of fairly large area in North Province: groundnuts; large area of wild palms in South Province: piassava. Crops of small area (no statistics): benniseed, peppers; large area not cultivated: oil palm
			[45] Groundnuts 5,930
Guinea (French)	1928[46]	Not available (184,561)	Groundnuts 98,840, tobacco 46,949, sesame 22,239, cotton 16,533
			[47] Food crops: millet, maize, sweet potatoes, manioc
Guinea (Portuguese)	1928[48]	Not available (107,632)	Groundnuts 78,578, rice 28,664, sugar cane 390. [49] Groundnuts, rice, millet, mandioca, sweet potatoes
Gambia Colony and Protectorate (British)	1928[50]	Not available	Groundnuts 76,772 tons. Food crops mentioned: guinea-corn, millet, maize, rice
			[51] Maize, tobacco, sweet potatoes
			[52] Groundnuts
Senegal (French)	1922[53]	Not available	Chief food crops: millet, rice, maize, manioc
	1928[54]	(1,380,053)	Groundnuts 1,260,210, rice 111,195, cotton 8,648
North Africa			
Rio de Oro and Adrar (Spanish)	1930[55]	Little or none	
Ifni (Spanish)	1928[56]	Not available	Olives, oranges, almonds, honey
			[57] Dates and gardens
Morocco (Spanish)	1930[58]	Not available	Mostly native
Morocco (French)	1929[59]	7,166,379	Barley 3,162,223, wheat 2,750,245, maize 586,578, sorghum 193,931, beans 126,330, chick peas 87,448, coriandre 58,108
			Trees by number: olive 4,834,767, almond 1,695,208, date 507,332, citrus 241,699. Vines 13,748,349
Algeria (French)	1928–29[60]	6,232,139	Barley 3,106,719, wheat 2,678,512, oats 199,244, beans 68,900, tobacco 38,288, grain sorghum 37,251, chick peas 30,245, maize 16,449, peas 10,783
			Trees by number: wild olive 3,470,472, cultivated olive 5,482,985, date 6,634,894. Vines (both native and European) 1,669,615 acres
Tunis (French)	1927[61]	7,913,000 (native and European)	(Native only) Wheat 1,096,191, barley 816,885, oats 45,490, vines 1,601
			(Native and European) Beans 76,514, maize and grain sorghum 32,330, chick peas 18,132, flax 6,150, potatoes 2,471, tobacco 1,169
			(Native and European) Trees by number: olive 16,152,986, date 1,207,682, almond 225,000, citrus 120,500, carob 21,000
French Sudan Colony (French)	1927[62]	Not available	Cereals and legumes 2,653,854
	1929[63]	(3,021,291)	Groundnuts 197,680, cotton 161,850
			[64] Sisal 7,907; also cotton and hemp
Territory of the Niger (French)	1927[65]	2,440,152	Millet 1,983,020, beans 267,179, groundnuts 99,833, manioc 30,838, cotton 17,717, maize 12,219, sweet potatoes 6,795, rice 6,560
Upper Volta (French)	1927[66]	5,556,686	Food crops: millet 4,230,352, maize 370,650, beans 60,440, pennisetum 123,550, rice 17,297, sweet potatoes and yams 4,942
			Industrial: groundnuts 505,320, cotton 244,135
Mauritania (French)	1927[67]	17,297	Millet, maize, rice, groundnuts together: 17,297
Tripolitania (Italian)	1928[68]	Not available (172,970)	Barley 148,260, wheat 24,710
Cyrenaica (Italian)	1928[68]	Not available (84,326)	Barley 56,100, wheat 26,336, table grapes 1,520, olives 370

NATIVE CROP PRODUCTION

Total acreage	84,049,286

PRINCIPAL CROPS IN ACRES

Sorghum and Millet	11,126,098	Bananas	1,584,377	Cloves	81,000
Wheat	8,249,116	Sweet Potatoes	696,773	Potatoes	56,408
Barley	7,708,808	Sesame	476,397	Sugar Cane	56,114
Maize	5,526,594	Oil Palm	397,633	Vanilla	53,000
Cotton	4,003,145	Coffee	238,088	Wattle	20,859
Groundnuts	2,960,775	Cacao	181,687	Rubber	20,247
Manioc (Cassava)	2,595,886	Sisal	178,966	Linseed	17,269
Peas and Beans	2,453,199	Coconut	168,945	Kapok	3,100
Rice	2,065,776	Tobacco	152,862	Chillies	1,464

[1] Estimate based on personal observation. See Shantz, H. L.: Agriculture in East Africa; Supplementary Chapter to Education in East Africa, by Thomas Jesse Jones, Phelps Stokes Fund, New York, p. 353–401. See also Great Britain Department of Overseas Trade: Economic Conditions in Ethiopia, 1929–31. In Abyssinia there are 102 million acres of land in a climate suitable for crop production of both warm-weather and cool-weather crops. Since agriculture is the principal industry, this is probably a conservative estimate of the land under cultivation.

[2] Great Britain Foreign Office, Handbook 109, London, 1920. Le Domanie Colonial Francais by Sir Hesketh Bell, *et al.*, Vol. III, Paris, 1930, p. 100. Country almost incapable of production of agricultural crops, except in small gardens, no adequate supply of water for irrigation. See also Peace Handbook, French Somaliland, 1920, p. 20.

[3] British Colonial Report, No. 1570, 1931, p. 6–7.

[4] International Yearbook of Agricultural Statistics 1929–30, p. 144–210. Not complete for total. Mannuale Di Storia Politico-Militaire delle Colonie Italiane, Ministero della Guerra Roma, 1929, p. 536, says there may ultimately be 10,000 hectares put under irrigation in the plain of Tessenni near the Sudanese border by the use of the water of Gasc River.

[5] International Yearbook of Agricultural Statistics 1929–30, p. 158–210. Not complete for total.

[6] Ministero della Colonie: Le Colonie Italiane Di Diretto Dominio, Anno 1929, p. 64.

[7] Egypt Ministry of Finance, Annuarie Statistique, 1928–29, p. 228, gives cultivated land 5,554,126 feddans, crop land 8,645,750 feddans, apparently includes double crop land twice, converted on basis of one feddan equalling 1.038 acres.

[8] Report on the Finances, Administration, and Condition of the Sudan in 1928, London, 1929, p. 74–5.

[9] Uganda Protectorate Blue Book for the year ended December 31, 1929, Entebbe, 1930, p. 120–124.

[10] Colony and Protectorate of Kenya Agricultural Census 1930, p. 25. Also Kenya Colony and Protectorate Native Affairs Department, Annual Report, 1930, p. 55–6.

[11] Zanzibar Protectorate Blue Book for the year ended 31st of December 1929, Zanzibar, 1930, p. 132.

[12] Tanganyika Territory Blue Book for the year ended 31st of December 1929, Dar Es Salaam, p. 193–199.

[13] Rapport Sur L'Administration Belge du Ruandi-Urundi Pendant Annee 1929, p. 90–92. See also Shantz, H. L.

[14] Nyasaland Protectorate Annual Report of the Department of Agriculture 1926, Zomba, 1927, p. 4, 21, 22. Estimated from European acreage on the basis of percentage of total production by natives assuming the same yield per acre, probably a very conservative estimate.

[15] Nyasaland Protectorate Blue Book for the year ended December 1929, Zomba, 1930, p. V 4.

[16] Northern Rhodesia Blue Book for the year ended 31st of December 1929, Livingstone, p. V 2. Also Government of Northern Rhodesia Department of Agriculture Annual Report for the years 1926–31, Livingstone.

[17] Southern Rhodesia Report of the Chief Native Commissioner for the year 1929, Salisbury 1930, p. 14. Probable grain yield indicates one to two million acres planted to grains alone by natives.

[18] East African Manual, p. 797.

[19] United States Department of Commerce, Commerce Year Book, 1932, Vol. 2, p. 635.

[20] Ibid., 1931, Vol. 2, p. 634.

[21] Official Year Book of the Union of South Africa, 1929–30, p. 1057.

[22] Ibid., p. 1071.

[23] Swaziland Administration, Census of Swaziland 3rd May 1921, p. 18.

[24] Union of South Africa, Report of the Agricultural and Pastoral Production of the Union of South Africa, 1926–27, Agricultural Census, No. 10, 1927, p. 5. Area of native crops not given by provinces.

[25] Report of the Union of South Africa to the Council of the League of Nations concerning the administration of South-west Africa, 1928. "Except in Ovamboland and on the Okawango River he (the native) does not worry about agriculture. The character of the country and his nomadic nature have been against this."

[26] International Year Book of Agricultural Statistics, 1929–30, p. 144–210. Mostly native production but includes both native and European.

[27] Rapport Annuel Sur L'Administration de la Colonie du Congo Belge Pendant L'Annee 1929, p. 54.

[28] International Year Book of Agricultural Statistics, 1929–30 and 1930–31.

[29] Ibid., 1929–30, p. 186.

[30] Great Britain Historical Section of the Foreign Office: Spanish Guinea, London, 1920, p. 34–5.

[31] International Year Book of Agricultural Statistics, 1929–30, p. 186.

[32] Ibid., p. 186, 200, 204.

[33] Report by His Britannic Majesty's Government to the Council of the League of Nations on the Administration of the British Cameroons for the year 1926, London, 1927.

[34] Blue Book Colony and Protectorate of Nigeria 1929, Lagos, 1930, p. 553. "It is not possible to give the number of acres under cultivation or the total of any crop. Most important crops in north are guinea-corn, various species of millet, cotton, groundnuts, and in the south yams, maize, cocoa, cotton, cassava."

[35] Report by His Britannic Majesty's Government to the Council of the League of Nations on the Administration of Togoland under British Mandate, 1925, p. 23.

[36] International Year Book of Agricultural Statistics 1929–30, p. 200, 210.

[37] Ibid., p. 200, 220.

[38] Annuarie du Gouvernement Generale de l'Afrique Occidentale Francaise 1922, p. 725–6.

[39] International Year Book of Agricultural Statistics 1930–31, p. 178. (Rice for 1929–30.)

[40] Annuarie du Gouvernement Generale de l'Afrique Occidentale Francaise 1922, p. 725–6.

[41] Gold Coast Colony Blue Book 1929–30, Accra, 1930, p. 777. Crops exported 1st of April 1929 to 31st of March 1930.

[42] International Year Book of Agricultural Statistics 1929–30.

[43] Strong, Richard P.: Harvard African Expedition 1926–27: The African Republic of Liberia and the Belgian Congo, Cambridge, 1920, p. 116–19.

[44] Sierre Leone Blue Book for the year ended 31st of December 1929, Freetown, 1930, p. 287.

[45] International Year Book of Agricultural Statistics 1929–30.
[46] Ibid., p. 194, 204, 210. Groundnut data from Year Book 1930–31, p. 216.
[47] Annuarie du Gouvernement Generale de l'Afrique Occidentale Francaise, 1922, p. 637–8.
[48] International Year Book of Agricultural Statistics 1929–30, p. 164, 172, 202.
[49] Agencia Geral da Colonais: Soletim Da Agencia Geral Das Colonais, Lisboa, July 1928, p. 58–9.
[50] Colonial Reports, No. 1444, Gambia, 1928, p. 6–7.
[51] Colony of the Gambia, Blue Book 1929, p. 179.
[52] Ormsby-Gore, W. G. A.: Visit to West Africa during the year 1926, London 1926, p. 164–5. "The bulk of the available labor in the colony is engaged in producing the groundnut crop. . . . A certain amount of rice and food stuffs is locally grown, but not in sufficient quantities to meet local requirements, the people apparently preferring to grow groundnuts and be dependent upon imported foods for their sustenance."
[53] Annuarie du Gouvernement Generale de l'Afrique Occidentale Francaise 1922, p. 493.
[54] International Year Book of Agricultural Statistics 1930–31. Data for cotton for 1929.
[55] Statesman's Year Book, 1930, p. 1289.
[56] Ortega, M. L. (Director): Anuario-Guia Oficial de Marruecos y del Africa Espanola, Madrid, 1928, p. 1058–9. ". . . very little space susceptible to improvement."
[57] Statesman's Year Book 1930, p. 1289.
[58] Ibid., p. 1102.
[59] Annuarie de Statistique Generale du Maroc, Annee 1929, p. 194, 180–190.
[60] Annuarie Statistique de l'Algerie, 1929, p. 124–62.
[61] Statistique Generale de la Tunisie 1927, p. 233–45.
[62] Bulletin Mensuel de l'Agence Economique de l'Afrique Occidentale Francaise, 1928, p. 118.
[63] International Year Book of Agricultural Statistics 1929–30, p. 200, 220.
[64] Annuarie du Gouvernement Generale de l'Afrique Occidentale Francaise, 1922, p. 916–20.
[65] Bulletin Mensuel de l'Agence Economique de l'Afrique Occidentale Francaise, 1928, p. 36.
[66] Ibid., 1928, p. 80–1.
[67] Ibid., 1928, p. 121. International Year Book of Agricultural Statistics, 1929–30, gives 4,942 acres of groundnuts for 1927.
[68] International Year Book of Agricultural Statistics, 1929–30, p. 144, 150.

ECONOMIC CONSIDERATIONS

As a rule the most fertile soil has the densest population. These lands are the deep rich alluvial river bottom lands and the rich mountain sides. Exceptions to this land use are found where areas are controlled by nomads or cattlemen or unusually strong tribal leaders.

In places almost every foot of land is cultivated and the huts stand in the midst of cultivated crops (Figure 9). At other times the planted areas are so small and scattered that the whole country looks virgin. In otherwise uncultivated areas one will find a termite hill partially leveled and planted to sorghum (Figure 10) or maize. In other places a single squash plant or a single hill of sorghum may be found.

FOOD CROPS

Great agricultural belts will be pointed out later, but local factors often play an important part in determining the type of crop grown. Food is almost always the prime consideration. In great areas of Uganda and the mountainous areas of Kenya, Tanganyika, and the East African highlands, bananas are grown and eaten almost to the exclusion of any other crop. Yet it is not uncommon to find eleusine or pennisetum practically take the place of the banana. Cassava also dominates as a food plant in many areas and is especially valuable in areas where an occasional drought produces failure in grain crops. Cassava requires four to six years to reach a relatively mature state, and during all this time can be used as reserve food which cannot be destroyed by drought.

FIGURE 21.—A Valencia orange orchard nine years old. Rustenburg, Transvaal.

MONEY CROPS

Pressure of outside influences often determines the type of crop. A wish for clothes, bicycles, or gin will force the production of a money crop (Figures 11 and 12). Another influence and probably the strongest one in developing a demand for a money crop is the system of taxation imposed by the governing European power. This often amounts to a twelfth or even a sixth of a man's total earning power. Forced to grow a crop for sale which is almost without exception an export product, there is a return not only in tax money but a return in raw material exported. It often happens that because of the great distances involved in transport only crops of high value such as tobacco or butter can be used. In some cases a man must leave his home and travel far to secure work with which to pay the tax, and in some cases forced labor, possibly a more humane method, is used to liquidate this enforced indebtedness.

By some, taxation is regarded as the most efficient means of forcing the native out of his naturally contented state to one more lucrative to the European overlord and more in keeping with the ideals of civilization and Christianity. By some, taxation is used as a

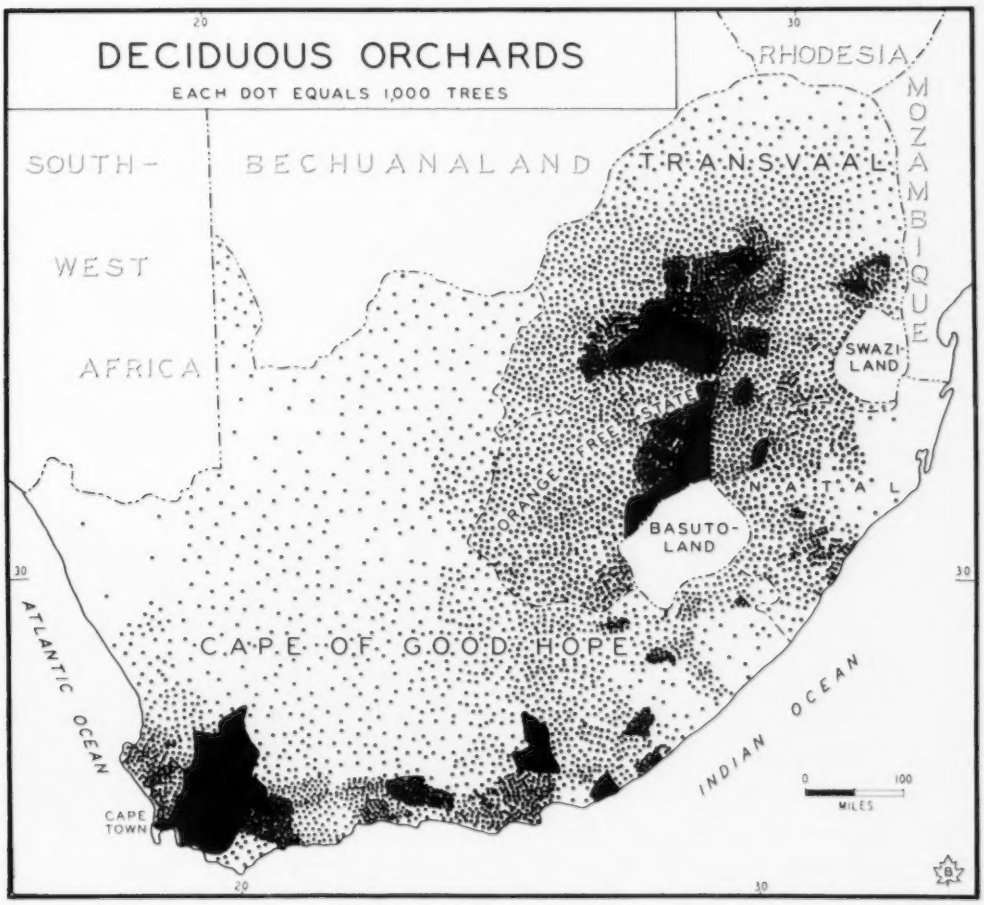

FIGURE 22.—Deciduous fruits are important in Cape Province, Transvaal, Orange Free State, and, to a lesser extent, in Natal.

thin veneer to cover forced labor or economic slavery.

The educational program and the missionary program if not carefully guided may easily become allies of the forces set up to destroy the customs and cultures of native African peoples. Every European influence, government, school, church, trader, and rum-runner, pushes the African in the direction of a money crop. The farther he is from market the more effective the tax plan is in demanding a change in type of agricultural production.

Stockmen have had less difficulty and have had to make fewer adjustments. They have been more heavily taxed because their wealth was more evident and more easily converted into cash. In some places in order to increase export they were forced to sell hides and skins which they previously ate.

But the crop producers far from market were forced away from the heavier staple crops to crops such as tobacco, oil seeds, rubber, and coffee, which could be economically transported to distant markets. Urundi exported hides, skins, gee, and beans, and Nyasaland was practically forced into tobacco culture to meet government taxation.

TYPES OF AGRICULTURE

As a rule food demands a diversified agriculture. There must be food ready

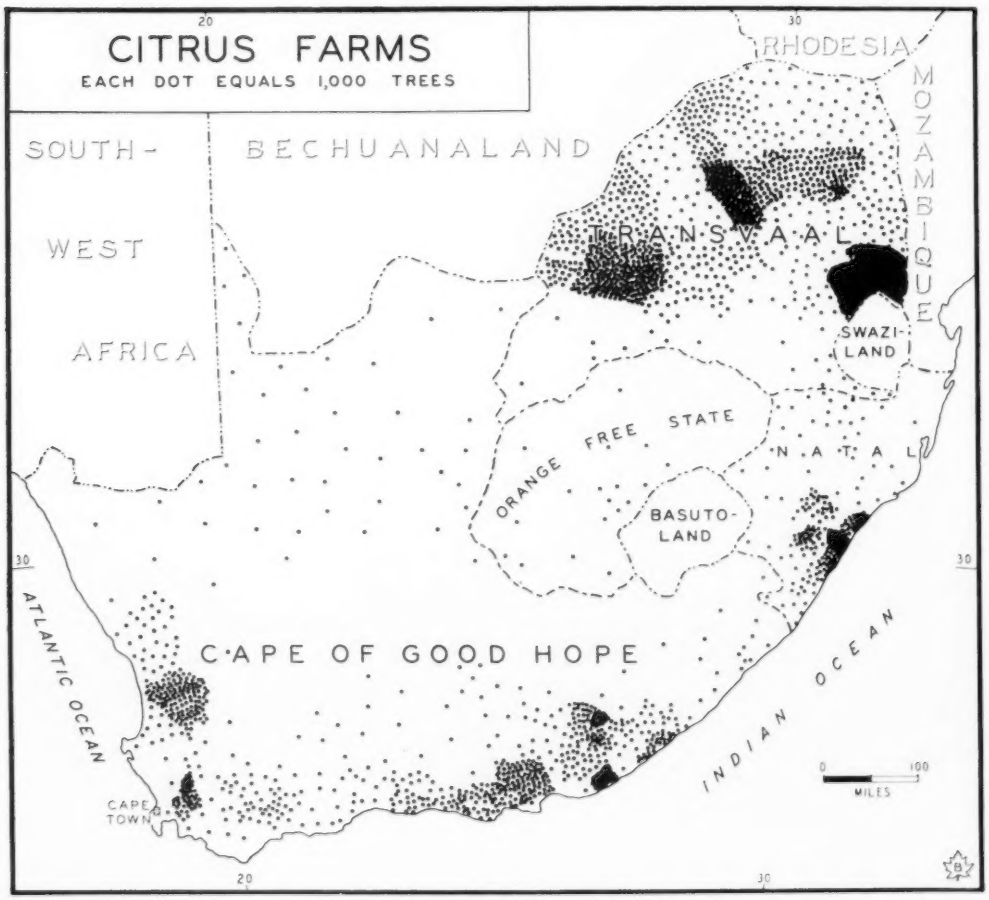

FIGURE 23.—Citrus fruits are important in the warmer parts of the Transvaal, in Cape Province and Natal.

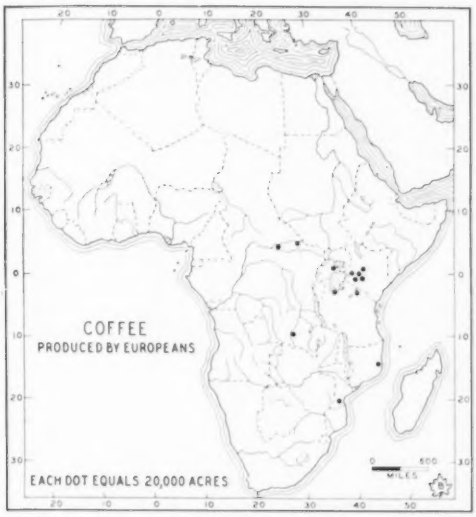

FIGURE 24.—Coffee is limited largely to the higher lands of tropical East Africa.

to eat each day and crops are generally planted in mixtures of kinds and ages.

In the warm weather cereal belts where crop harvest is to a large extent determined by the alternate wet and dry season, grains are stored in great baskets (Figure 14) protected from weather and termites. Here a swing in season, an early and severe drought, may mean crop failure and starvation to thousands of natives. Most of the governments have safeguarded their natives against this possibility by requiring them to deposit in government graneries (Figure 15) a supply of grain sufficient to carry them over the famine period.

ROTATION

The African practices a system of land rotation. A piece of land chosen because it is especially fertile is cleared and prepared for planting by the men. This land is used continuously by the women until yields fall off due either to a lack of proper physical tilth, decrease in soil fertility, or to the development of land diseases. The land is abandoned and a new area cultivated. The old area is allowed to revert to its natural state. By this method the native avoids all the troubles which our chemists, physicists, and biologists, with their modern, scientific equipment have only partially succeeded in avoiding under a continuous cropping system.

The African has been widely criticized for this method and the claim has been made that it brings about erosion and loss of the soil, but it is difficult to see how erosion could have been avoided by continuous use if it had taken place

FIGURE 25.—Vineyard of Kampoot grapes with peaches in the background. Wynberg, Cape Province. (Courtesy of *Atlas of Vegetation and Soils of Africa*, American Geographical Society.)

when the soil was left fallow. Due in part to the alienation or loss of pasture land such abandoned land may be overgrazed and then destructive erosion may set in. This result may not be inherent in the native system of rotation but induced by the encroachment of other natives or Europeans upon the area. As a rule native agriculture is admirably adjusted to the region, soil, and climate. The native is careful to choose just the right type of soil for each crop and to choose the right crop for new land. Money crops lead to a one-crop system which is not a good practice for it breaks down the diversified crop system of the native.

Native agriculture is based on the ability of nature to take care of abandoned land, free it from insect, fungus, and bacterial disease, and restore its fertility and physical condition. Good land is cleared and prepared for the crop. Cropped continuously until production begins to fall off it is then abandoned and a process of revegetation is begun which leads back to grass, brush, or forest as the case may be.

Climate and soil effect the rate of regeneration which may vary in its completion from a few years to several hundred. As this process goes on the land is gradually improved as a habitat for plant growth.

In Nyasaland approximately eight acres are required for each hut, but only about one acre is actually cultivated. If cultivation continued for three years each acre would lie fallow for over twenty years between crops.

FIGURE 26.—Arabian coffee, planted 9 x 9 feet with a row of banana every fourth, and of Grevillea every fifth row to protect the coffee from wind. Kiambe, Kenya.

If the native is forced to continual cultivation of land, two difficult situations are faced which even with modern science have not been adequately met. These are, first, to keep the land and the plants free from disease, and second, to maintain fertility and tilth. Moreover there is often no rest period due to drought or cold, and the land is kept continuously in crop until abandoned. Until the government is ready to meet this situation with an adequate scientific staff, it is unsafe to force the native from his natural system.

Irrigation agriculture is practiced by the Wachagga at Kilimanjaro in re-

FIGURE 27.—Hevea rubber plantation, between Kampala and Jinja, Uganda.

gions of relatively adequate rainfall, where they grow bananas, coffee, maize, sorghum, eleusine, beans, sweet potatoes, and yams. In Ethiopia cattle are used in preparing land for crops. A simple plow (Figure 7) consists of a wood point, sometimes tipped with steel, which is drawn through the soil. Seeds scattered over the surface are plowed in. On stony land this method succeeds admirably where a European plow would be practically useless. In Ethiopia besides barley, wheat, and similar crops, teff is an important food crop. The small seeds are crushed and the flour made into bread. This crop is planted in the depressions on black cotton soils where it is trampled when wet by domestic livestock.

FIGURE 28.—A field of sisal plants rather young. Embu, Kenya Colony.

In Urundi and Ruanda soil is planted as soon as the rains begin, and the soil surface is left almost level. In much of the high country of Nyasaland and East Africa, the soil is heaped up into ridges and these planted.

In the Congo and other heavily forested areas the trees are only partly removed (Figure 16), and the surface prepared for crops. Here bananas and cassava are planted, then maize and a little later, upland rice. The two

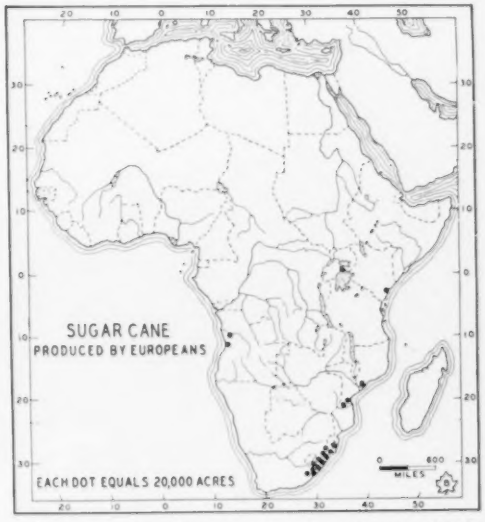

FIGURE 29.—Sugar cane is grown chiefly along the southeast coast in Natal, in Portuguese East Africa, in Kenya in the north, and in Angola on the west. These areas by no means indicate the limits of potential production of sugar cane.

annual crops are harvested and replanted until the cassava has crowded them out. Then the cassava is gradually removed to make way for the bananas. These now form a dense clump, yielding fruit for food and drink and are taken until the native forest plants finally shut them out.

There are many practices which, from any point of view, are excellent. In high grassland the grasses are cut and piled in a windrow. They are then covered with soil, thus producing ridges

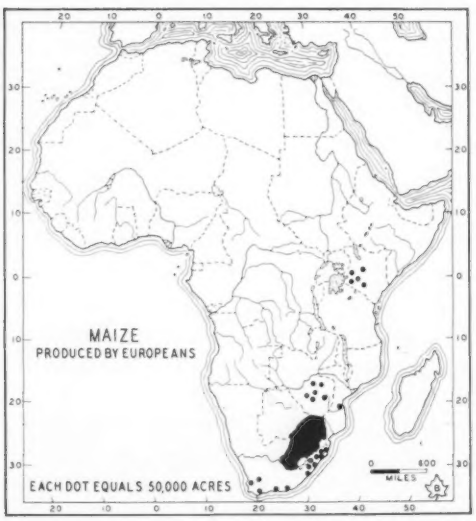

FIGURE 30.—Maize produced by Europeans is largely confined to Transvaal and the Orange Free State, with smaller amounts in Cape Province, Natal, Southern Rhodesia, and Kenya.

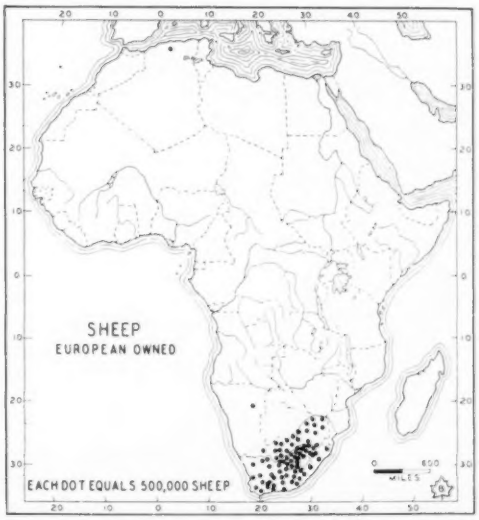

FIGURE 32.—European owned sheep are limited largely to the Union of South Africa with a few in Algeria.

(Figure 18) in which the grass lies, with ditches between. The grass is then ignited and gradually smolders through, leaving most of the valuable salts in the soil, the charcoal to improve the physical condition and drying out the surface soil to make it more tillable and easier to plant. It partially sterilizes the soil, making it more productive, and kills many harmful insects. To have allowed the grass to remain without burning would probably have resulted in having most of it eaten by termites and any nutritive or mineral value removed. Had it been decomposed by bacteria, the soil would have been

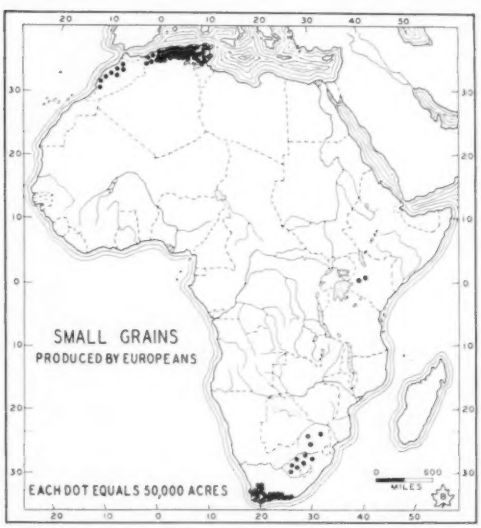

FIGURE 31.—The small grains are produced chiefly in Cape Province and Algeria and Morocco, with a small amount in the Orange Free State, the Transvaal, and Kenya.

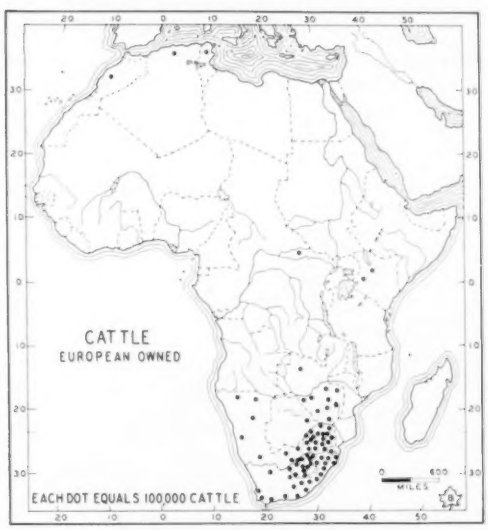

FIGURE 33.—European owned cattle, more widely distributed than sheep, are found mostly in the Union of South Africa and Southern Rhodesia, but extend into Northern Rhodesia, Kenya, the Congo, Algeria and Morocco.

depleted in nitrogen by these cellulose reducing organisms. It is difficult to imagine a practice which more nearly meets the requirements set up by soil chemistry, soil physics, and plant physiology.

AREA UNDER EUROPEAN OCCUPATION

The total area under European occupation (Table I) amounts to over 293,000,000 acres, or about 7.3 per cent of the total acres of land capable of crop production. All figures are probably low because of the imperfect records from many of the countries.

The amount of land which has passed from African to European ownership (Figure 17) is naturally greatest in South Africa where the Cape of Good Hope leads with over 123 million acres, followed by the Transvaal with over 38 million, Orange Free State with nearly 31 million, southwest Africa with over 23 million and southern Rhodesia with over 19 million. Although no figures are available, it is probable that Algeria would fall into this list. Northern Rhodesia, with nearly 12 million, Natal with over 10 million, the Belgian Congo with over 9 million, Kenya with over 7 million, and Nyasaland with over 4 million, follow and are among the better developed countries of the areas which are still dominated largely by native agriculture. A less developed group includes Portuguese East Africa with nearly 3 million, French Morocco with nearly 2 million, Swaziland with nearly 1 million, Tripolitania and Tunis with nearly 800 thousand each, Portuguese Guinea with nearly 400 thousand, Egypt with over 500 thousand, and British Cameroons with nearly 300 thousand, and Uganda with 250 thousand.

FIGURE 34.—Ranch cattle with sheep and eucalyptus in background. Gwebi, Southern Rhodesia.

This record shows great inequalities when one considers the size of the country involved. This can be avoided partly by expressing the land alienated to Europeans per square mile of that land area. On this basis Orange Free State leads with 616 acres per square mile of land owned by Europeans, followed by Cape of Good Hope with 445, and the Transvaal with 345, and Natal with 290. These are old settled countries and one would as likely expect the Indians to hold large acreages in the eastern United States as to expect the African natives to hold large acreages in the Union of South Africa.

In Swaziland about 148 acres are European-owned per square mile, in

Southern Rhodesia 130 acres, in Nyasaland 84 acres, in Southwest African Mandate 75acres, in Northern Rhodesia 41 and in Kenya 33 acres.

Areas in which over 10 per cent of the land is European-owned (Figure 19) include the Union of South Africa, Southern and Northern Rhodesia, and Southwest African Mandate. Algeria should probably be placed in this group, but figures are not available. European holdings are relatively small in Tunis amounting to only 12 acres per square mile, 10 acres in the Belgian Congo, 9 in Portuguese East Africa, French Morocco, and the British Cameroons, and less than 3 acres in Uganda.

FIGURE 35.—Sheep, a cross between wooled Persian, and merino. Gwebi, Southern Rhodesia.

The portion of Africa where there is no alienated land (Figure 19) lies mostly north of the equator in the tropics except for Basutoland in South Africa.

AREA UNDER EUROPEAN CULTIVATION

The records of Table I show about 16,000,000 acres of land under cultivation (Figure 20) or about 5.5 per cent of the area of occupation.

The amount of land under European cultivation is greatest in South Africa. The Transvaal leads with over 3 million acres of which maize constitutes about 2 million acres, followed by teff, Kaffir corn, wheat, orchards, oats, tobacco, cotton, and potatoes. The Cape of Good Hope is second with over 3 million acres of which wheat, oats, maize, Lucerne, and rye constitute about half of the total production. Orange Free State is next also with over 3 million acres of which maize constitutes over three-fourths, followed by wheat, oats, teff, Kaffir corn, and rye. The fourth position is taken by Algeria, with 2.25 million, half of which is wheat and over a third oats and barley. Natal is fifth with 1.2 million acres, over a third of which is maize and a fifth sugar, with cotton, Kaffir corn, bananas, teff, oats, orchards, potatoes, and tea making up most of the remainder. Kenya with 645 thousand is sixth and here over a third is maize, with sisal, coffee, wheat, barley, sugar cane, coconuts, and tea constituting about half of the area. French Morocco with 529 thousand is next with wheat, oats, and barley constituting 84 per cent with peas, maize, beans, and chickpeas next in importance. Portuguese East Africa exceeds half a million, of which three-fourths are coconuts, sisal, maize, sugar cane, pineapples, cotton, and coffee.

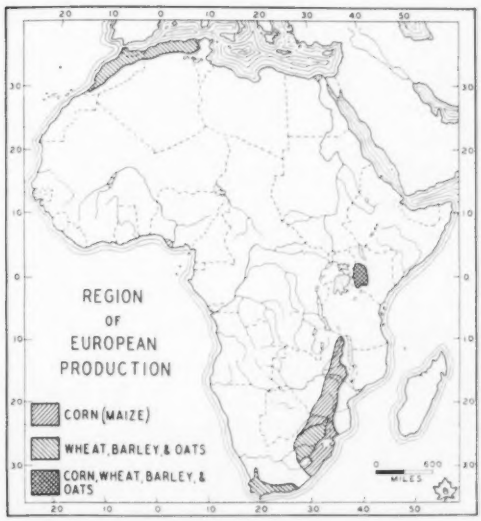

FIGURE 36.—The maize and small grain areas on the basis of European production form an interrupted belt from Cape Province over the highlands of East Africa to Kenya and a belt across North Africa including Morocco and Algeria.

In order of acres under European cultivation the next of importance are Tunis, 432 thousand chiefly wheat, vines, oats and barley; Southern Rhodesia 407 thousand acres chiefly maize, Madagascar 286 thousand of rice, cassava, vanilla, coffee, and cloves; Belgian Congo 194 thousand, nearly three-quarters of which is coffee, oil palm, rubber, cacao, and sisal.

In order of decreasing acreage, the others are Italian Somaliland, 70 thousand acres, Nyasaland 60, Northern Rhodesia 54, British Cameroons 54, Southwest Africa 42, Angola 35, Bechuanaland 32, Uganda 30, Swaziland 16, Urundi and Ruanda 9, French Sudan 8, and Senegal 7 thousand acres.

Most of the areas dominated by Europeans are given over to specialized agriculture. In South Africa deciduous fruits (Figure 22) are important in Cape Province (Figure 25), Transvaal, Orange Free State and to a lesser extent in Natal. Citrus fruits (Figure 26) are important in Transvaal (Figure 21), Cape Province and Natal and in Southern Rhodesia. The season which places this fruit on the market six months ahead of the American and European crop insures an exceptionally good price.

East Africa produces both deciduous and citrus fruits in rather small quantity. Coffee (Figure 24) is grown in Kenya (Figure 26) by European farmers and to a lesser extent in Tanganyika, Uganda, and Nyasaland. This is Arabian coffee *Caffea arabica* native of Kaffa, the southwest province of Ethiopia. This species is the most important coffee grown and forms a large part of the world supply. There are also native coffees in the mountain forests of Kenya and two west African coffees *Caffea robusta* and *C. liberica* with large berries and adapted to the tropical rain forest climate. Arabian coffee requires a cooler climate and does well in the temperate forest regions of Kenya, Tanganyika, and Nyasaland.

Ananas or pineapples are grown almost everywhere in small quantity

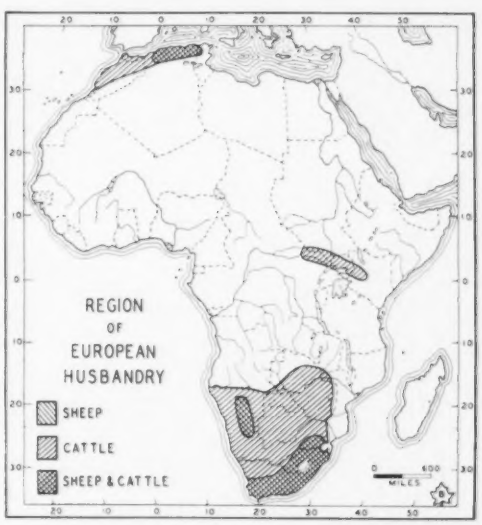

FIGURE 37.—The European cattle and sheep region covers the Union of South Africa, Southern Rhodesia, and parts of Northern Rhodesia, a strip from Kenya across Uganda and the Lado Enclave and the Morocco and Algerian belt in North Africa.

but commercially are limited largely to Cape Province, Portuguese East Africa, and Natal.

Rubber is not extensively grown but the chief plantings are Uganda (Figure 27), Kenya, Nyasaland, Belgian Congo, Cameroons, and Liberia. Para rubber is the principal crop although the Germans planted Cear extensively in Tanganyika. Palm oil as a European crop is grown chiefly in Portuguese Guinea, Dahomey, the Congo, and Angola.

Sisal is extensively grown in Kenya (Figure 28) and Portuguese East Africa and also in Tanganyika, Nyasaland, the Congo, and Senegal. Sugar cane (Figure 29), is commercially produced in Natal, Portuguese East Africa, and Kenya,

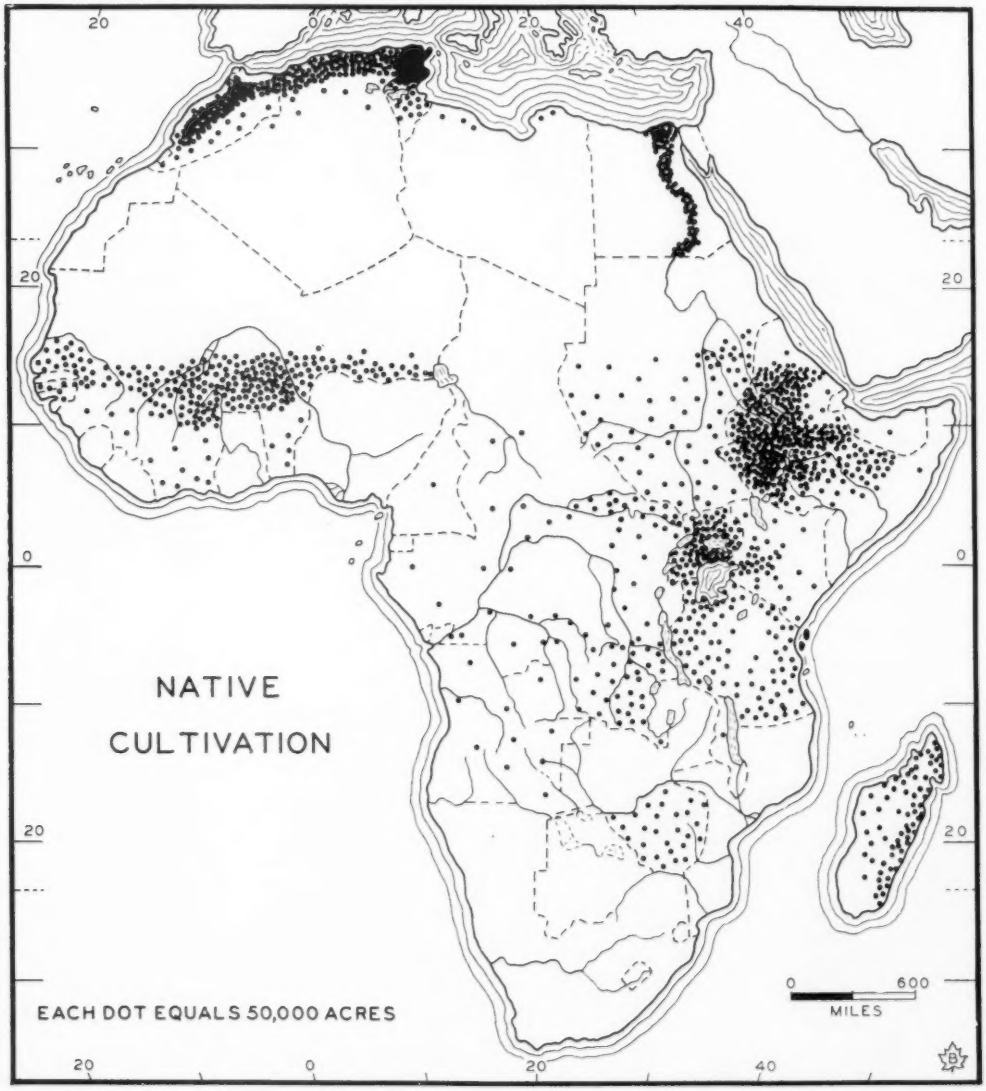

FIGURE 38.—The amount and location of land cultivated by natives is derived from acreage records only. The Mediterranean, east African highlands, and the Sudan, mark the most productive portions. However, the records of native production are by no means complete. The rich lands of the Sudan, of Urundi and Ruanda, of Portuguese East Africa, Swaziland, and Basutoland would, if records were complete, stand out as important productive areas.

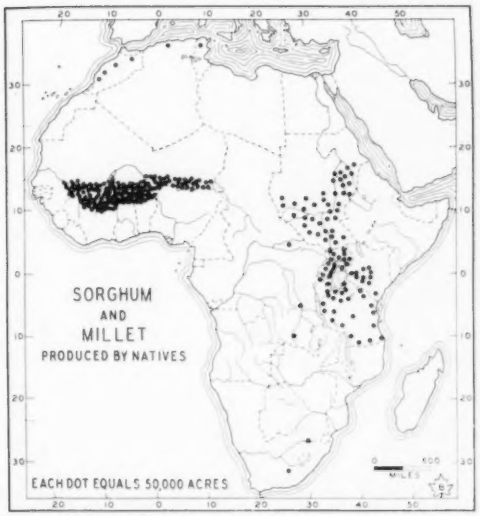

FIGURE 39.—The greatest production of millet and sorghum is in the drier part of the western Sudan with a second area including the Anglo-Egyptian Sudan, Uganda, Kenya, and Tanganyika. These areas mark out isolated portions of the great sorghum belt.

and coconuts chiefly in Portuguese East Africa, Kenya, and Tanganyika. Tobacco is chiefly grown in Southern Rhodesia, Transvaal, Nyasaland, Algeria, and Northern Rhodesia; Irish potatoes are produced in Algeria, Transvaal, Cape Province, Natal, and Southern Rhodesia; cacao in Spanish Guinea and Fernando Po, British Cameroons, the Congo, Angola, French Equatorial Africa, Dahomey, and the Ivory Coast.

These crops fall into definite belts or zones. The small grains are limited in commercial quantities to the Mediterranean and Cape regions with a smaller production in the highlands of South and East Africa. They lie in the tropical zone in the areas adapted to cool weather crops. Wheat is by far the most important of the small grains and is produced in the following countries in the order of decreasing production: Algeria, Cape Province, Tunis, French Morocco, Orange Free State, Transvaal, Kenya, Southwest Africa, Southern Rhodesia, and Nyasaland. Oats is next in importance and is grown in Algeria, Cape Province, Orange Free State, French Morocco, Transvaal, Natal, and Southern Rhodesia. Barley is most important in Algeria, French Morocco, Cape Province, Tunis, and Kenya. Rye

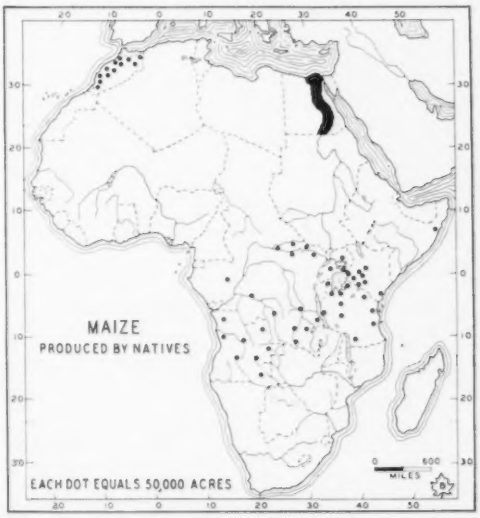

FIGURE 41.—Native production of maize is most important in Egypt, Morocco, and the tropical portion of the continent. Maize extends beyond the sorghum and millet belt, both in the north, and in the more humid portions of tropical Africa.

FIGURE 40.—A field of maize, young plants. A termite hill rises at the rear. Munama, Belgian Congo.

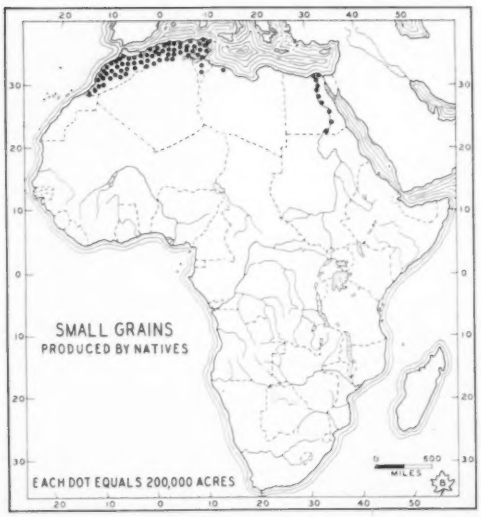

FIGURE 42.—Native production of small grains is recorded in Morocco, Algeria, Tunis, and Egypt. If records were complete, Ethiopia would also be marked out as a small grain producing country.

is practically confined to Cape Province and Orange Free State.

Teff, a grain crop in Ethiopia, is grown as hay in the Transvaal, Orange Free State, and Natal, while lucerne as a hay crop is grown chiefly in Cape Province and Orange Free State.

FIGURE 43.—A native field of grain sorghum with a platform on which a child is stationed to protect the crop from birds. Rejaf, Anglo-Egyptian Sudan.

Peas and beans are hard to reconcile with other crops since so many forms are included in this designation. Algeria leads in production, followed by French Morocco, Cape Province, Transvaal, Orange Free State, Natal, Northern Rhodesia, and Southern Rhodesia.

For the continent as a whole, maize leads (Figure 30) in acreage with 5,860,000 acres or over 36 per cent of the total acreage in cultivated crops. The small grains (Figure 31) wheat (16 per cent), oats (7 per cent), barley (4 per cent), and rye (0.3 per cent), total about 4,500,000 acres, or 28 per cent of the total. Kaffir corn and millets (386,000), sugar cane (Figure 29) (289,000), orchards and vineyards (280,000), teff (265,000), and peas and beans (245,000), each occupies about 2 per cent of the area under European cultivation. Coffee (Figure 24) (221,000), sisal (190,000), lucerne (180,000), occupy a little over 1 per cent each, while coconuts (151,000), tobacco (112,000), pota-

FIGURE 44.—A clove plantation. Bububu, Zanzibar.

toes (106,000), cotton (96,000), and cacao (93,000), less than 1 per cent of total area. Oil palm (54,000), rubber (35,000), pineapple (31,000), tea (18,000) bananas (16,000), and groundnuts (10,000) follow in order.

The present production of many of these crops is only an indication of what could be done if economic and social needs should ever demand a greater use of land for these purposes.

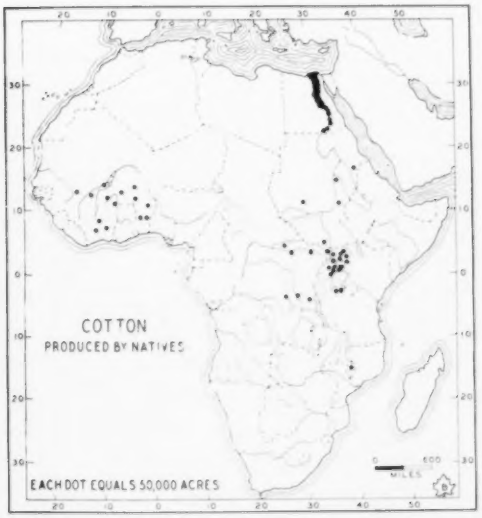

FIGURE 45.—Records of cotton production by natives are most complete and accurate in Egypt, in Uganda, in scattered areas in the western Sudan, and in the Congo, Tanganyika, and Nyasaland.

SIZE OF FARMS

Some idea of the size of farms can be obtained from the Union of South Africa where:

4% of the farms are under 10.5 acres
8% between 10.5 and 42.5 acres
9% between 42.5 and 210 acres
30% between 210 and 1,060 acres
20% between 1,060 and 2,010 acres
14% between 2,010 and 4,020 acres
5% between 4,020 and 6,030 acres
4% between 6,030 and 10,500 acres
2% between 10,500 and 21,000 acres
1% over 21,000 acres.

In all probability large holdings are

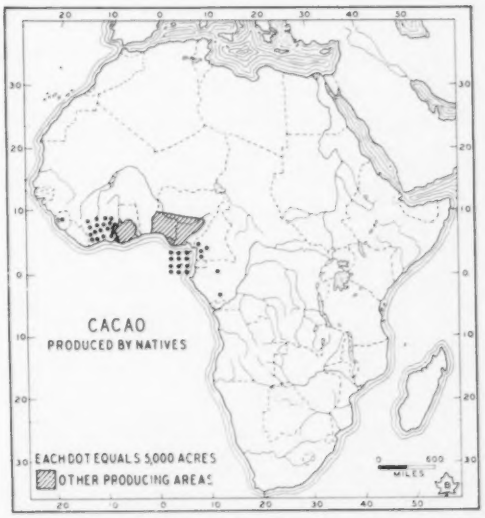

FIGURE 46.—Records of acreage of native production of cacao are limited to west Africa, where it is extensively grown in the Ivory Coast, Fernando Po, French Cameroons, French Equatorial Africa and Sierra Leone. The Gold Coast and Nigeria also are heavy producers of cacao, although the acreages are not recorded.

the rule wherever the white man has bought land in Africa.

In general, Africa is not adapted to European crops. Only southern and northern portions and the highlands throughout the more tropically located

FIGURE 47.—Kavirondo cotton field. Budama, Uganda.

lands are adapted to the temperate crops.

DOMESTIC ANIMALS EUROPEAN OWNED

Domestic animals European owned (Table II) amount to about 54,000,000. For the total area of land under European occupation this would amount to a little over 5 acres for each animal. It would amount to about three animals for each acre of cultivated land. If sheep and goats are reduced to cow units on the basis of four sheep or goats to the cow, the total cow units would be about 19,000,000 or a little over one animal unit per acre of cultivated land.

In percentages of total numbers, the different animals owned by Europeans rank as follows: sheep 72 per cent, cattle 13 per cent, goats 10 per cent, horses, donkeys, and pigs a little over one per cent each, and mules and ostriches a fraction of one per cent each. There are also a few camels.

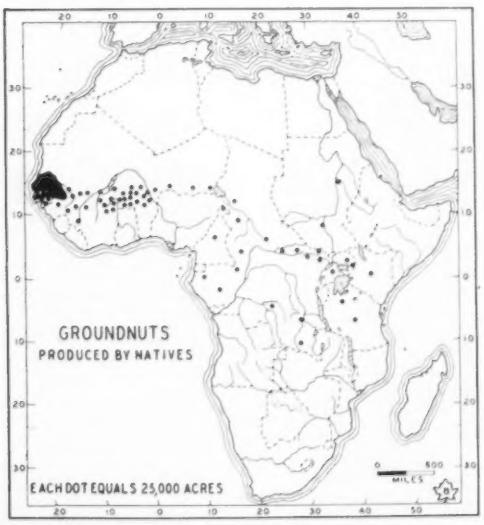

FIGURE 48.—Native production of groundnuts (peanuts) is found mostly within the sorghum and millet belt. Senigal and the west Sudan region and scattered production in central and east Africa indicate in general terms the area best suited to groundnut production.

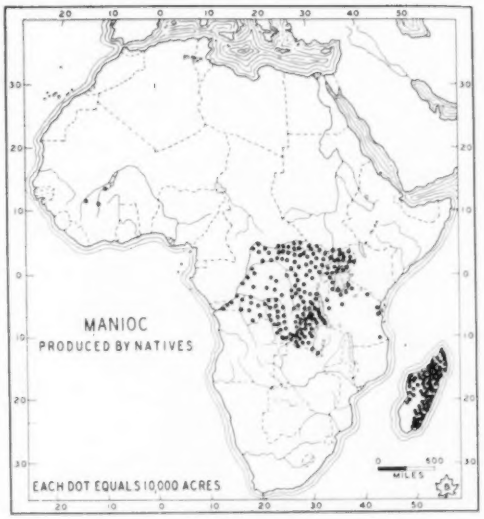

FIGURE 49.—Native production of cassava (manioc) is most marked in the Congo and Madagascar, with Uganda, Tanganyika, and the Territory of the Niger also recording acreage under production.

Sheep total about 39,000,000 and 96 per cent of these are in the Union of South Africa (Figure 32). Nearly half of the sheep, or 47 per cent, are in Cape Province; Orange Free State has nearly a third, or 28 per cent; while Transvaal has 13 per cent; Natal 6 per cent; Southwest Africa is next and is followed by Algeria with a little over one per cent each. These are followed by Kenya, French Morocco, Tunis, Southern Rhodesia (Figure 35), and Nyasaland, with a few in Uganda and Fernando Po, all totaling less than 2 per cent of the continental total.

Cattle are, next to sheep, the most numerous, numbering about 7,700,000 (Figure 33). On the basis of forage consumption they would about equal the sheep and are much more evenly distributed than the sheep. The Union of South Africa has 70 per cent of the total, the Transvaal leading with 23 per cent, Orange Free State 20 per cent, and the Cape with 17 per cent, followed by Southern Rhodesia (Figure 34) with 12 per cent, Natal with 10 per cent, and

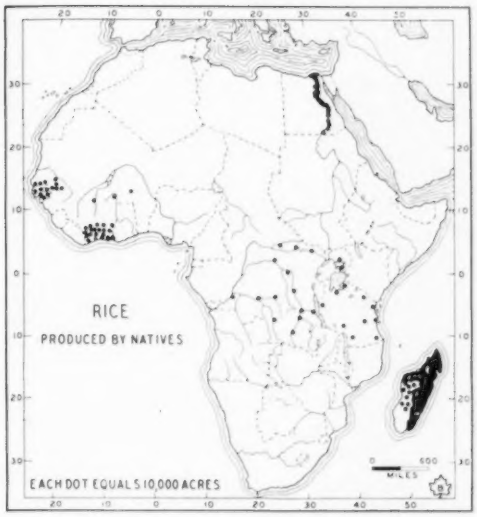

FIGURE 50.—Native production of rice recorded in acreage is confined largely to Madagascar, Egypt, the Ivory Coast, Congo, Gambia, and Tanganyika, with small amounts in almost every part of the more tropical portions of the continent.

Southwest Africa with 7 per cent, Kenya about 3 per cent, Algeria 2 per cent, and Northern Rhodesia and the Congo about one per cent each. Swaziland, Bechuanaland, French Morocco, Tunis, and Portuguese East Africa have a little less than one per cent each, while a few are found in Nyasaland, Basutoland, Uganda, and Fernando Po.

Goats rank third, numbering about 5,300,000. The Union of South Africa has about 59 per cent of the goats, Cape Province leading with 55 per cent and is followed by Southwest Africa with 37 per cent of the continental total. Goat production is even more concentrated than sheep production for these two countries have 92 per cent of the continental total. Transvaal has 2 per cent, Algeria less than 2 per cent, Natal, Orange Free State, Portuguese East Africa, and Tunis all less than one per cent, while a few are found in French Morocco, Southern Rhodesia, Bechuanaland, Congo, Swaziland, Kenya, Northern Rhodesia, Nyasaland, Uganda, and Fernando Po.

Horses rank fourth with about 743,000, or, roughly, one horse to every ten cattle. About 88 per cent of the horses in Africa are in the Union of South Africa. Orange Free State leads with nearly a third and Cape Province follows with about 28 per cent, the Transvaal with 17 per cent, Natal about 10 per cent, Algeria over 6 per cent, and Southwest Africa 2 per cent. Tunis and Morocco each have about one per cent, followed by Southern Rhodesia, Kenya, Basutoland, Swaziland, with a few in the Congo, Bechuanaland, Northern Rhodesia, Fernando Po, Portuguese East Africa, and Nyasaland.

European owned donkeys are less numerous than horses and constitute about one per cent of the continental total for domestic animals. About 90 per cent of these are in the Union of South Africa, Cape Province having 50 per cent, Transvaal 26 per cent, Orange Free State 7 per cent, Natal 6 per cent, Southwest Africa 5 per cent, Southern Rhodesia about 2 per cent, Algeria one per cent, and French Morocco, Swaziland, Bechuanaland, Tunis, Kenya, a

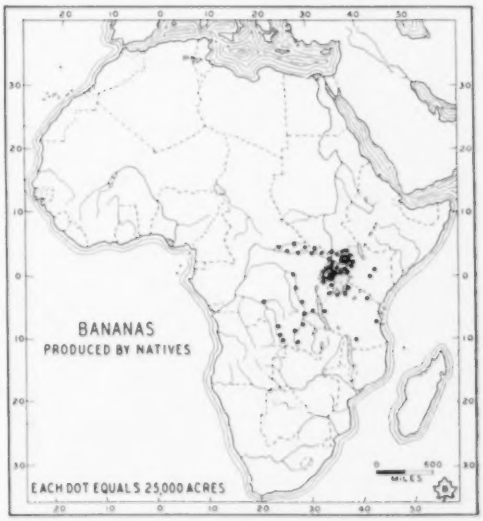

FIGURE 51.—Recorded native production of bananas in area is confined to tropical Africa, chiefly the higher, cooler portions of Uganda, the Congo, Tanganyika, and Kenya.

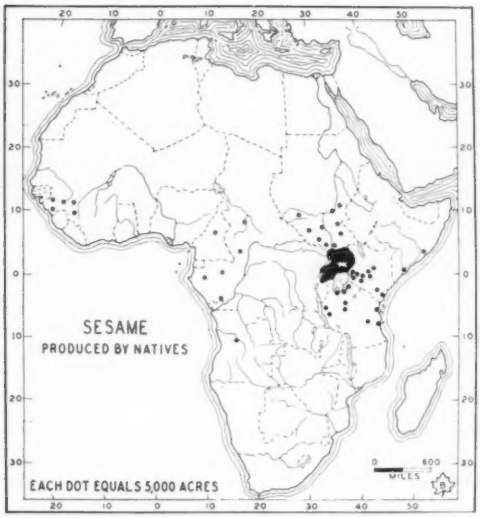

FIGURE 52.—Acreage of native produced sesame is recorded in Uganda, Anglo-Egyptian Sudan, Tanganyika, Kenya, French Equatorial Africa, French Guinea, and Italian Somaliland, and a small amount in Angola and the French Cameroons. Production is confined almost exclusively to the central tropics.

fraction of one per cent, while a few are found in Portuguese East Africa, Northern Rhodesia, the Congo, Nyasaland, and Uganda.

Mules are about a third as numerous as donkeys. While the Union of South Africa has about 60 per cent of the mules, only Cape Province with 40 per cent leads Algeria with 29 per cent of the continental total. Transvaal has 8 per cent, Orange Free State 7 per cent, Tunis 6 per cent, Natal 5 per cent, French Morocco 4 per cent, and Southwest Africa one per cent; while Southern Rhodesia, Kenya, Swaziland, Bechuanaland, Basutoland, Portuguese East Africa, Northern Rhodesia, Uganda, Nyasaland, and the Congo have a few each.

Ostriches in European ownership are limited to the Union of South Africa and of these 98 per cent are in Cape Province, with a few in the Transvaal, Orange Free State, and Natal.

Camels owned by Europeans are confined to French Morocco, Algeria, and Tunis.

If European agriculture alone were used as a basis of distinguishing agricultural regions, it would be largely a classification of the temperate regions only. A wheat and small grain region (Figure 36) including the strip of temperate brushland and grassy plains of Algeria and Morocco, the high, temperate lands of Kenya, the Cape Colony, and the high plateau of Orange Free State and the Transvaal.

The sheep and cattle (Figure 37) area follows almost the same pattern except that both sheep and cattle extend down into the adjacent desert regions. In general terms, livestock plays an important part in European agriculture, the maize belt being very closely associated with the cattle industry.

The agricultural regions of Africa, considered on the basis of European agriculture, have been developed mostly in the temperate brushland and the dwarf-palm temperate grasslands of the Mediterranean and Cape regions to which are confined largely the production of small grains. If the tall grassland of Orange Free State and the Transvaal is included, it will take in the corn belt and most of the domestic stock. With this area should be united also Southern Rhodesia and Natal.

NATIVE CROP PRODUCTION

Data are not available adequately to present the status of native crop production in Africa. Table III lists 56 divisions on which we have figures, such as they are, for 19, minimum estimates for 14, and no figures at all for 23.

Among the 23 are some of the densely populated and most productive countries such as Urundi and Ruanda, the Cameroons, Nigeria, Tongoland, Gold Coast, Ashanti, and Northern Territory, Liberia, and Gambia. An attempt will be made later to fill out the blank areas in the picture here presented.

FIGURE 53.—A banana plantation, typical of Uganda. Kimule, Uganda.

The total number of acres here recorded as cultivated by native peoples is over 84,000,000 acres (Figure 38). A rough estimate was made on page 19 that the acreage here recorded is only about 55 per cent of the total of cultivated lands, and that the total is probably more nearly 150,000,000 acres. The sample here presented is fairly representative and will show the relative importances of the various crops.

Of the 84,000,000 acres, over 11,000,000 acres, or 13 per cent of the total area, are growing sorghum and millet (Figure 39). Wheat comes next with over 8,000,000 acres; barley is next with 7,700,000 acres, or 10 per cent of the total, followed by: maize with 5,500,000 acres or 6 per cent; cotton with 4,000,000 acres or 5 per cent; groundnuts, important as an oil crop, occupy nearly 3,000,000 acres or 3.5 per cent; manioc 2,600,000 acres or 3 per cent; peas and beans 2,500,000 acres or 3 per cent; and rice 2,000,000 acres or 2.5 per cent. Bananas, important in the tropical highlands, occupy over 1,500,000 acres or nearly 2 per cent. Sweet potatoes, with nearly 700,000 acres, or less than one per cent, are followed by sesame 476,000, oilpalm 398,000, coffee 238,000, cacao 182,000, sisal 179,000, coconut 169,000, tobacco 153,000, cloves 81,000, potatoes 56,000, sugar cane 56,000, vanilla 53,000, wattle 21,000, rubber 20,000, linseed 17,000, kapok 3,000, and chillies 1,500. This by no means exhausts the crops produced by natives. Squash, pumpkin, tomatoes, yams, sugar cane, cucumbers, melons, okra, sweet peppers, cabbage, and many other vegetables and fruits are grown.

One cannot classify crops as temperate and tropical since many of the crops grown in the temperate regions require high temperature, especially such as cotton, millet, sorghum, and maize. Likewise, bananas and coffee thrive in a temperature ideal for the growth of cool-weather crops such as oats, wheat, and potatoes. In other words, if it were not for frost such crops as bananas, coffee, and many other tropical plants would grow well with the small grains. It seems best to separate crops into warm-weather and cool-weather crops.

WARM-WEATHER GRAIN CROPS

Of the 84,000,000 acres here considered, millets and sorghum rank as the most important in acreage and occupy about 13 per cent of the area cultivated. These warm-weather crops (Figure 43)

FIGURE 54.—Rice field. Koto Koto, Nyasaland.

are of the greatest importance to the African since they furnish him with food and drink and are easily stored and transported. The upper Volta leads with 38 per cent of the recorded total and the Niger follows with about 18 per cent, and the Anglo-Egyptian Sudan with 14 per cent. Tanganyika is fourth with 12 per cent, Uganda next with 8 per cent, Kenya with 5 per cent, and French Morocco with 2 per cent. Even these scattered figures mark out rather sharply a great sorghum belt (Figure 39), an area of rather high temperature and well marked drought period.

Maize ranks fourth with about 6 per cent of the area. Egypt is outstanding with 38 per cent (Figure 41) followed by the Congo (Figure 40) with 11 per cent, Morocco 11 per cent, Tanganyika 10 per cent, Kenya 7 per cent, Upper Volta 7 per cent, Madagascar 4 per cent, Uganda 2 per cent, French Equatorial Africa one per cent, with maize recorded also in Italian Somaliland, the Anglo-Egyptian Sudan, Tunis, the French Niger, and Eritrea. This discussion is only on the basis of acreage recorded, and while it is factual material, it is by no means complete. While maize, sorghum, and millet are grown in the same belt, maize is grown under irrigation more than is sorghum, and also tends to replace sorghum in the more humid or more tropical countries. Sorghum, millet, and maize distribution in Africa (Figures 39 and 41) show a definite belt lying between the tropical forest region and the more desert grasslands.

FIGURE 55.—A coconut grove. Notches cut in the trunk enable the natives to climb the tall trees to collect the fruit. Huts are made mostly from the leaves. Dar-es-Salaam, Tanganyika.

COOL-WEATHER GRAIN CROPS

Wheat and barley rank second and third as native crops on the basis of acreage, wheat 10 per cent and barley 7 per cent of the area recorded for native crops. French Morocco produces 33 per cent of the wheat, Algeria 32 per cent, Egypt 19 per cent, and Tunis 14 per cent. A small amount is produced in the Anglo-Egyptian Sudan, Cyrenaica, Tripolitania, Eritrea, Tanganyika, and Angola.

Barley is produced in the same areas which produce wheat. French Morocco leads with 41 per cent and Algeria produces 40 per cent, Tunis 8 per cent, Egypt 5 per cent, Tripolitania 2 per cent, Cyrenaica and Eritrea less than one per cent each, and a small amount in the Anglo-Egyptian Sudan. These small-grain crops fall entirely in the zone of temperate crop production as outlined in Figure 42 except extensions into desert areas by irrigation. In Tanganyika and Angola they are produced at elevations sufficient to produce a cooler climate. Both the warm-weather cereals and the cool-weather cereals mark agricultural regions or zones which

designate potentiality rather than actual production. The small grains can be greatly expanded in the higher lands of the tropics. The warm-weather cereals can be produced beyond their natural belt by irrigation and can be grown with fair success even in the more humid regions of Central Africa. Maize and, to a lesser extent, sorghum, can compete with cassava and rice, while wheat and barley may compete with bananas and coffee at higher elevations. But such decidedly cool-weather crops as potatoes, cabbage, and garden peas are also grown throughout the African tropics. This, however, does no. justify including this tropical area in the small-grain belt. That crops can be pushed far into the tropics does not mean that they will ever occupy more than a garden status in such areas.

FIGURE 56.—Wachagga hut in a native plantation of Arabian coffee with bananas as windbreak. Warangu, Tanganyika.

CASH CROPS IN THE WARM-WEATHER CROP BELT

Cotton ranks fifth due largely to the demands of the European market, but leads as a warm-weather cash crop with about 4 million acres.

In cotton Egypt leads with about 45 per cent of the continental total (Figure 45), and Uganda (Figure 47) second with 17 per cent. The Congo with 8 per cent, Anglo-Egyptian Sudan 7 per cent, the Upper Volta with 6 per cent, the Ivory Coast with 4 per cent, are followed by Dahomey and Tanganyika with 3 per cent each. A small amount is produced in Nyasaland, French Togoland, Italian Somaliland, Territory of the Niger, French Guinea, Angola, Kenya, Eritrea, and Senegal. It is also exported from Nigeria and British Cameroons. No other tropical cash crop ranks high in acreage.

On recorded acreage of cacao Ivory Coast leads with 54 per cent (Figure 46), followed by Fernando Po 32 per cent, and the French Cameroons 10 per cent, French Equatorial Africa 5 per cent, and Sierra Leone with 3 per cent. Although acreage cannot be cited, Gold Coast and Nigeria are the heaviest producers of cacao.

French Guinea records 31 per cent of the tobacco acreage, Algeria 25 per cent, followed by Nyasaland, Madagascar, and French Equatorial Africa each with 10 per cent, and by Angola with 6 per cent, Tanganyika with 3 per cent, and Uganda with 2 per cent, and Tunis with one per cent.

Cloves are limited in their production to Zanzibar Protectorate 59 per cent, where they are produced on the Islands of Zanzibar (Figure 44) and Pemba, and to Madagascar 41 per cent. These islands produce the world's supply.

Vanilla is produced in Madagascar, and rubber and kapok by natives chiefly in Tanganyika.

Following cotton, which is fifth in order on the basis of acreage, are the following crops and their percentages of the total of all crops grown and recorded for natives; groundnuts 3.5 per cent, manioc 3 per cent, peas and beans 3 per cent, sweet potatoes 2.5 per cent, and bananas 2 per cent.

Groundnuts are widely distributed,

but are limited to the warm weather areas and almost entirely in the tropics. Senegal leads with almost 43 per cent of the total acreage (Figure 48). The Congo and French Sudan are next with 7 per cent each, followed by French Equatorial Africa with 6 per cent, and the Territory of the Niger, French Guinea, Uganda, Dahomey, and Portuguese Guinea with about 3 per cent each. Tanganyika, Anglo-Egyptian Sudan, and the French Cameroons have about 2 per cent and a small acreage is found in Kenya, the Upper Volta, the Ivory Coast, and Angola. Nigeria and Sierra Leone produce large quantities for export but no acreages are available.

Manioc or cassava (Figure 49) is a staple food crop in much of tropical Africa. The Congo leads with 55 per cent of the total and is followed by Madagascar with 30 per cent, Uganda with 8 per cent, Tanganyika with 5 per cent, and a small acreage in the Territory of the Niger. It is grown extensively in Sierra Leone. No crop grown by natives is more highly prized and affords so sure a protection against a crop failure by drought as does cassava.

Peas and beans of many varieties are grown for both food and export. They may be either cool-weather or warm-weather crops. But they are lumped together here. Egypt leads with 22 per cent, followed by Tanganyika with 14 per cent, Kenya 12 per cent, Uganda 12 per cent, Territory of the Niger 11 per cent, French Morocco 9 per cent, Congo 9 per cent, Algeria 4 per cent, Tunis 3 per cent, the Upper Volta 2 per cent, and a small amount in the Anglo-Egyptian Sudan.

FIGURE 57.—Mixed culture, consisting of banana, manioc, groundnuts, sweet potato, maize, beans, eleusine, sorghum, colocasia, etc. Rusoka, Urundi.

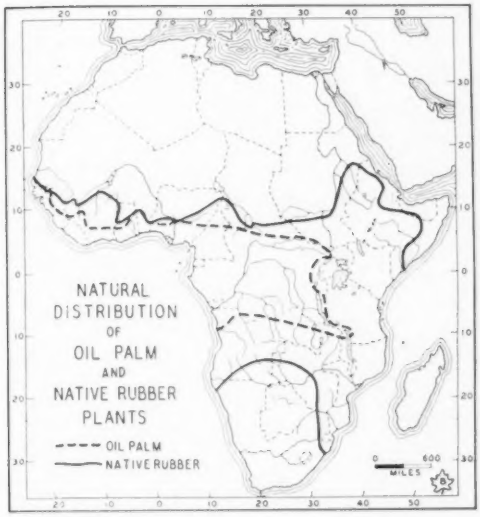

FIGURE 58.—This graph shows (broken line) the natural limit of distribution of the oil palm. Plantings are mostly within this area of natural distribution. It also shows (continuous line) the limit of production of more important native rubber plants.

Rice (Figure 54) is prized as a food crop. Madagascar records 62 per cent of the total acreage (Figure 50), Egypt 13 per cent, the Ivory Coast 10 per cent, Congo 7 per cent, Gambia and Tanganyika 5 per cent, with Uganda, Portuguese Guinea, the Upper Volta of the Niger, French Equatorial Africa, and Angola recording small acreages.

Bananas of many varieties are grown for food. They range from the high mountains to sea level and from cool weather to warm weather. Uganda stands out as a banana producing (Figure 53) and consuming country. Here they constitute the major part of the native diet and occupy the land for miles to the exclusion of any other crop. The acreage in Uganda is 51 per cent (Figure 51), of the total, followed by the Congo with 32 per cent, Tanganyika with 14 per cent, and Kenya with 3 per cent. The crop is consumed locally as a vegetable or for the production of native alcoholic drinks. The fiber and leaves constitute more important wrapping material used in preparing other produce for export.

Sweet potatoes and yams are usually grouped together, but the yam (*Dioscorea*) grows as vine over poles or low trees and is grown extensively at higher altitudes. The sweet potato (*Ipomoea*) is not harvested at one time but the roots are dug out as needed and the vines are used as fodder. Uganda leads with 61 per cent followed again by the Congo with 23 per cent and Tanganyika with 14 per cent. The Territory of the Niger and the Upper Volta produce above one per cent each.

Many other crops belong in this section and are important but do not occupy large acreages. Sesame (*Simsim*) is an important oil seed used for food and export. Uganda produces 45 per cent (Figure 52), the Anglo-Egyptian Sudan 20 per cent, Tanganyika 11 per cent, Kenya 10 per cent, French Equatorial Africa 5 per cent, French Guinea 5 per cent, Italian Somaliland 2 per cent, and a small amount in Angola and the French Cameroons. Nigeria also exports sesame.

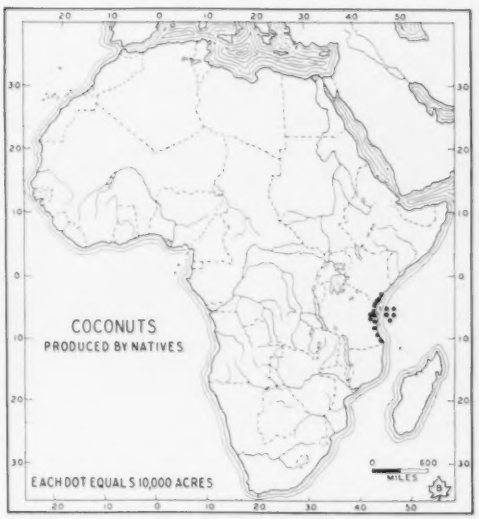

FIGURE 59.—Native production of coconut is recorded along the coast of Tanganyika, Kenya, and on Zanzibar and Pemba. Coconuts are grown only on the coasts.

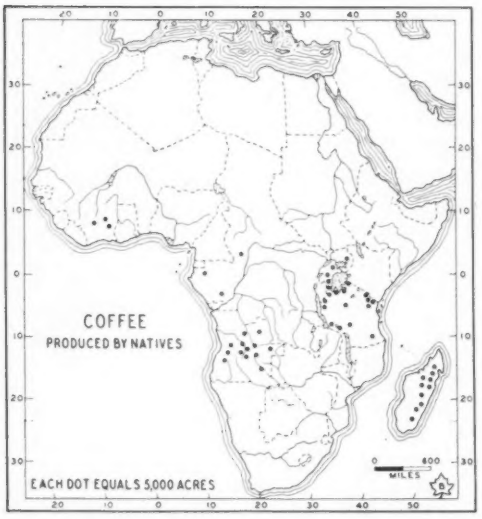

FIGURE 60.—Native production of coffee of both the Arabic and Liberian types is recorded in Tanganyika, Angola, and Madagascar with small amounts grown in the Ivory Coast, Uganda, and French Equatorial Africa. In Kenya and Ethiopia, coffee grows as a wild plant in the temperate rain forests.

Oil palm acreage is recorded from the Congo but it is also grown and exported from Nigeria and the Gold Coast. It is widely distributed and used in the tropical portions of Africa. The limits of natural growth of oil palm are shown in Figure 58.

Coconuts are grown on the East Coast (Figure 55) both for milk and for copra. They are limited to the coast and are not grown successfully inland (Figure 59).

Tanganyika produces about 45 per cent of the sugar cane acreage, Kenya 39 per cent, and Uganda and Angola 7 per cent each. It is grown as food crop almost everywhere in tropical Africa.

COOL-WEATHER CROPS IN THE TROPICS

The highlands of the tropics are especially productive. Here native populations are often dense and crops of great importance and variety are grown. Small grains such as wheat, barley, and oats, especially in Ethiopia, are of prime importance. In the higher mountainous country (Figure 57) bananas flank the mountains and serve as one of the most important vegetable food crops. Yams, sweet potatoes, pearl millet, Eleusine, maize, sorghum, groundnuts, pigeon peas, soy beans, cowpeas, tomatoes, tobacco, Voandzeia, and tropical and temperate fruits can all be grown and are widely distributed.

It is doubtful if any portion of the world has a wider range of potential crop production than the more temperate highlands of the tropics. From an European point of view coffee is by far the most important of these crops. Its growth by natives is not determined entirely by the environment and their desire to grow coffee. In Kenya natives are not encouraged to grow coffee, but in the mandated territory of Tanganyika (Figure 56) coffee growing has been encouraged. Tanganyika produces 33 per cent (Figure 60), Angola 26 per cent, Madagascar 21 per cent, Ivory Coast 7 per cent, Uganda 7 per cent, and French Equatorial Africa 6 per cent of the acreage of native grown coffee.

Native production of sisal is practically entirely confined to Tanganyika where many plantations fell into their hands as a result of the war. A small amount is grown in French Equatorial Africa. Madagascar produces about 80 per cent of the potatoes and they are also produced in Tanganyika, Uganda, Tunis, and South Africa. Wattle is produced by natives in Kenya. Linseed chiefly in Eritrea, and Nigeria; and chillies in Uganda.

Natives produce a great variety of crops and the potential production of the continent is very great. Rubber confined mostly to Tanganyika, could

be produced in many of the colonies; and the same is true of coffee, tea, tobacco, cotton, and maize.

If native crops alone are considered, a great maize, sorghum, and millet region (Figures 39 and 41) extends across the temperate regions of north Africa and Egypt, the highlands of east Africa and the temperate regions of south Africa. It also includes the better parts of the Anglo-Egyptian Sudan and extends in a broad belt south of the Sahara west to the Atlantic. Except for the extension south of the Sahara, this belt corresponds almost exactly with the small grain belt (Figure 42).

(The next installment will appear in the April issue.)

THE SZECHWAN VILLAGE FAIR

J. E. Spencer

IN many parts of the world the village fair is an intimate part of rural economy. Most Chinese villages hold fair day at some time during every month of the year. The frequency of these fairs and the volume of business transacted is one measure of the prosperity of a district. Normally the village fair in China is not an exhibition event as is the American fair of today. The occasionally held exhibition fair is now to be found in large cities and is similar to the occidental industrial and commercial fair from which it probably is derived. The village fair on the other hand, is a marketing occasion for the rural inhabitants of a given district. To it they bring their products for disposal in barter or cash sale either to the villagers or to purchasing agents who frequent the village fairs. To the fairs also come itinerant peddlers of manufactured goods, wandering native doctors, dentists, fortune tellers, and dispensers of mystic charms. That this simple generalization does not fit all Chinese fairs is to be expected. In some parts of China enormous fairs are held in small cities once or twice a year, running for indefinite periods and attracting thousands. Such fairs do an enormous business, both wholesale and retail. Some areas hold only general fairs, while others also have specialized fairs at which grain, wool, livestock, and other particular products are offered. In this article the writer deals only with the general village market-fair as it is developed in Szechwan.

The Village and Its Rural Area

It has been presumed that China is primarily a land of villages, and many false generalizations have been made upon this basis. It is enough at this time to say that the Szechwan village dwellers comprise only a minor percentage of the total population. In this province the village usually is a small settlement filling various functional rôles for the large scattered population of a given district, though it cannot be said that the village exists solely as a service center for such districts, since many villagers do own and cultivate farms near their respective villages. The village-dwelling farmers, as a rule, control but a small percentage of the total farm land and may or may not engage in other activities centering upon the village. In heavily populated districts villages are close together and larger than in scantily inhabited areas. In some districts no point is even five miles from some village, while at the other extreme are areas in which it may be fifteen miles to the nearest village, with travel and transportation difficult. (This refers to the Red Basin portion of the province rather than to the mountainous borders of sparse population.) These distances are not to be judged by standards adjusted to motorized or wheeled traffic, for, in most of Szechwan, there is no wheeled traffic even today. The distances are to be understood in terms of how far people can walk in a day, a round trip and time to spend at the village. That almost all goods are moved by human carrier does not appreciably affect the time element, since the loaded carrier's regular gait is fully as rapid as an ordinary brisk walking pace. In most of Szechwan roads are but narrow paths winding through the fields and over the terraced

hills. The most traveled are paved with blocks of stone, and bridges are numerous and well built, affording easy crossing of the many streams. By nature of the agricultural system most field boundaries are traversable and the resulting network allows infinitely variable travel. Therefore it is impossible to map all the country roads that permit the population of a district freely to travel cross-country in any direction to any point they choose. On the accompanying map of Chienwei County, western Szechwan, only those village roads are shown which are considered to be the main routes between villages. In the eastern part of the district mapped these routes are but a small

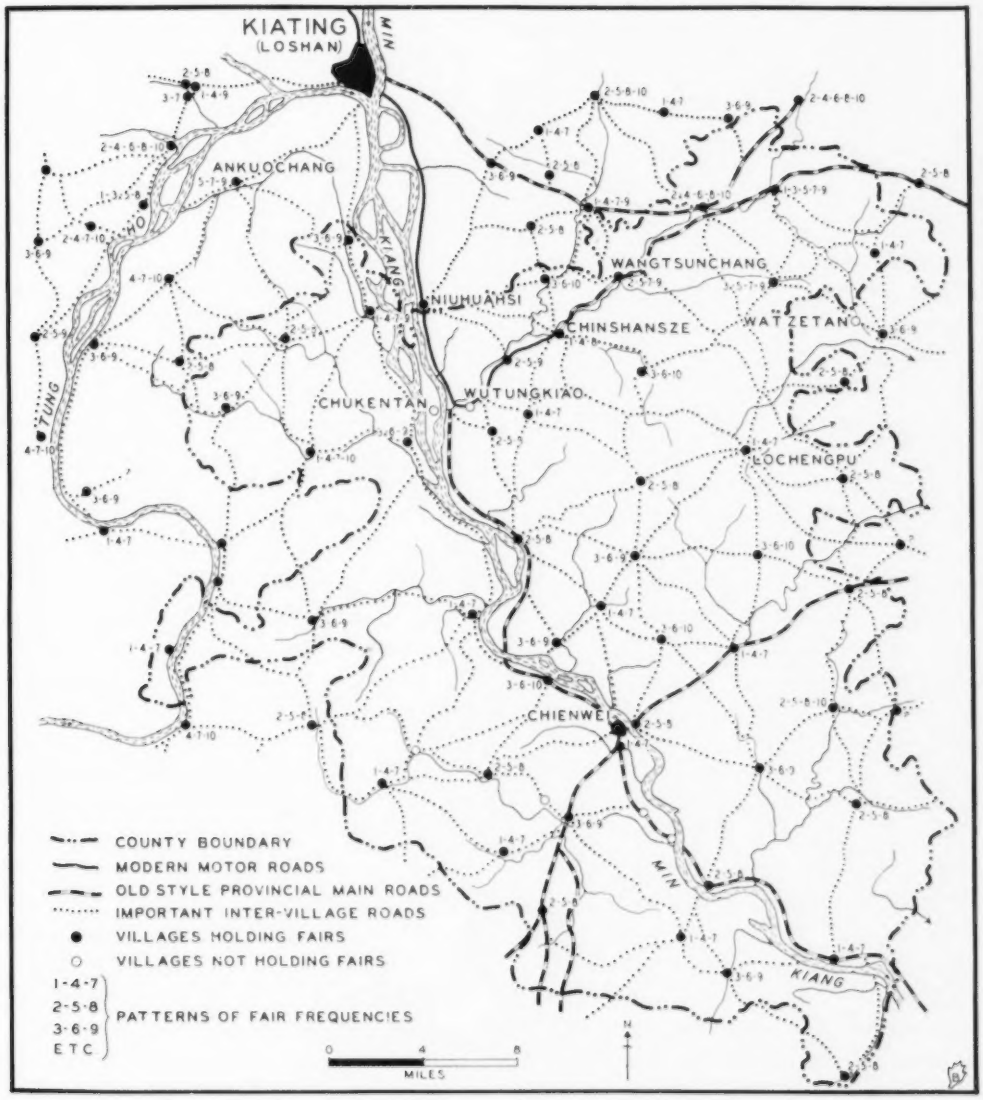

FIGURE 1.—Chienwei County of western Szechwan serves to indicate the importance of urban fairs in the local economy of China and to represent the pattern of urban distribution and highway connections. The sequence of fair days in the centers of any community is adjusted to reduce the competition among neighboring localities and to afford greatest advantages for both buyer and seller.

FIGURE 2.—Chintsachang, a village of twenty-two families in the county northeast of Chienwei county, was built adjoining an old temple which occupies the rear ground of the picture. The fair meets in the extra wide street which is more a fair ground than a real street in so small a village. The whole village is shown in this picture which was taken on a non-fair day.

fraction of the possible ones, while in the southwest and west the relief becomes more rugged and the roads actually are fewer in number.

In a prosperous and populous area people will not go a long way to a fair, but will organize fairs at points nearer to hand. The question can here be raised as to which comes first, a village or a fair? There is considerable evidence that the desire for a fair nearer to home, in a growing and prospering area, must account for a goodly number of the younger villages of Szechwan. In other parts of China the writer has seen fairs held on open sites which possessed no permanent buildings after some years of use as fair grounds. In Szechwan this is almost inconceivable, for here the village and the fair are now closely related. The common term for village in use in Szechwan is "ch'ang" which literally means "arena" or "enclosure," i.e., an enclosed space in which to hold a fair. This implies permanent buildings of some kind, hence its use to denote "village," though it is normally applied only to those villages which do hold fairs. There is mutual relation here for, in the ordinary course of events, neither a new fair nor a new village can arise without the other. In some cases a temple or a road station with a cluster of houses may be chosen for a fair site and quickly built into a village or, if there be no cluster of houses in the right location, a village may be wholly created upon the proper spot (Figures 2 and 3). Not always is there a special open site for the fair and most frequently the main street is the enclosure referred to in the term "ch'ang." In some villages the street is wide enough to provide a good fair ground; in others the street may be narrow and the temple-theater court may be the only open space, or even this may be lacking. In any case the main street, often the only street, is the location of the bulk of the fair transactions.

The permanent population of a market village may vary from twenty or thirty families to five or six hundred, depending upon the location and prosperity of the district. A fair worth attending requires a certain minimum number of permanently maintained eating houses and tea shops, medicine shops, butcher shops, general goods stores, and extra buildings to provide sub-let stall space to local folk and itinerant peddlers. The district must be productive of a range of agricultural produce worth buying. There must be capital available through villagers or visiting purchasing agents to buy a considerable volume of local produce. While a share of business is the trading about of vegetables, fruits, and petty products, it is at the village market-fair that the farmer must sell his cash-crop produce in the different seasons of the year. If the permanent occupants of a village are too poor they attract neither peddlers and buyers nor local produce, and without all these elements no fair can continue to function.

Even in prosperous areas there seems to be an upper limit to the size of a fair

village. The size of the permanently resident body depends partly upon the attendance and business volume of a fair, and there is a limit to size in the successful operation of a market fair. It is rare for a market village to exceed one thousand families, say about five thousand people. Increased attendance normally means increased volume in a limited range of products, and without a special fair ground a village street-fair becomes hopelessly congested when more than a couple of thousand country folk attend it. It seems probable that when the population of a given district becomes too great a new fair may be organized at some convenient point to duplicate the older market in appearance and performance but to make easier the physical operation of the fair. The lack of extensive level ground in Szechwan and the crowded and limited physical sites of most villages seem to support this viewpoint. There are, of course, villages of larger size than one thousand families, but generally if a district possesses resources or business that allow development of a settlement of over a thousand families that village gradually loses its character as a distinctive market village. The routine demands for farm produce in such a village becomes sufficiently great that a daily market is required rather than a periodic one, and more numerous permanent shops replace the itinerant peddlers of manufactured goods. This in time abolishes the market fair as a specific institution. Wutungkiao and Chukentah, on the accompanying map, are two large villages without fairs. Wutungkiao, with a population of some two thousand families, is a prosperous center of salt production and distribution and Chukentan, with perhaps fourteen hundred families, is closely connected with native boat transportation on the Min River (Figure 4). Niuhuaki, on the other hand, with a population of nearly three thousand families closely dependent upon salt production has a fair, though it confines itself to local farm produce for the most part. These three villages are special cases of settlements that no longer are market villages only. Both Wutungkiao and Chukentan have held fairs in the past, and Niuhuaki has not yet given up its fair. All other villages shown on the accompanying map are primarily market villages, though some of them have to do with special products such as salt, coal, and wood.

FIGURE 3.—About thirty families permanently occupy the village of Sanchiaosze, north of Wangtsunchang in the next county. The village is less than ten years old and was wholly created in demand for an additional fair-site. There is no temple at or near the village despite its name, and a site was chosen on a drainage divide midway between three other villages. The buildings at present are constructed entirely of bamboo and thatch, and most of the space is devoted to tea shops and eating houses. The street is of ordinary width and as yet completely unpaved. A fair is here in progress, attracting about three hundred people on average days.

DATING AND MANAGEMENT OF FAIRS

It might seem that the dates for holding fairs are of no particular importance since the villages are idle on non-fair days. In the working schedule of the village fair is an example of regional coöperation. The system has long been fixed and works with reasonable success, notwithstanding occasional inter-village friction arising out of competitive jealousies. By holding neighboring fairs on a different calendar pattern it is possible for a given area

FIGURE 4.—This view along the only street of Chukentan shows a lime-cement paved street, well grown trees, homes, and permanent shops which provide considerable contrast to the street of the average fair-village.

to have a fair within reach almost every day and thereby greatly to extend its market facilities. Few country folk restrict their fair attendance to that of a single village, and even the residents of one village are quite apt to visit fairs at neighboring villages. This plan also facilitates the purchasing agents and itinerant peddlers who may regularly patronize all the fairs of a considerable area in a short time. The fairs are run on the old lunar calendar, and there has grown up a definite sequence of dates and frequencies which are dependent upon the volume of business the villages can command. In the ordinary case a frequency of three fairs per ten-day period is found, making nine fairs every month. There are several patterns of this frequency. Perhaps the most common is that known as one, four, seven, meaning that a fair will be held on every day whose number ends in one of those three numerals. The nine fairs in a month would then be held on the following days: 1, 4, 7, 11, 14, 17, 21, 24, 27. Other common nine-fair patterns are: two, five, eight; three, six, nine; three, six, ten; four, seven, ten; and five, seven, nine. (Three, six, ten and four, seven, ten patterns omit the last meeting of the month in the short months of twenty-nine days.) There is no need for periodic announcement of the fair dates, as the patterns are changed only at very infrequent intervals of decades or centuries. Everyone whose life is affected by village fairs knows the schedules by heart for all the villages in his district.

If the business volume of an area can support a more frequent meeting of the fair a fourth date may be added, such as one, four, seven, nine, which will provide three extra markets per month. If this in turn proves inadequate a fifth date per ten-day interval will be added to make the pattern a simple one in which either all the odd days or all the even days will be fair days, providing for fifteen fairs per month. Since the fair pattern is determined by the village elders in their own way one cannot lay down any simple limits of business volume or patronage which produce certain frequencies. On the other extreme the writer is aware of no Szechwanese village which maintains a fair with less than nine meetings per month. (In the northwest sector of the map, Figure 1, are shown three connected villages, of which one has but six scheduled fairs per month. This cannot be considered an exception to the rule mentioned, as in the three villages combined fairs are held on eight days out of ten which are available to all.) If a village cannot promote sufficient business to maintain a nine-meeting fair the intervals between fair days become too long for all concerned, and the institution will be forced to close. The village of Watzetan is an example of this kind. The area has a small salt production but no other outstanding resources. The village used to support a moderately successful nine-meeting fair, but competition from the fair of a

village quite close gradually proved too strong, so that the Watzetan fair lost patronage and finally was abolished. The near-by village has grown steadily larger, has a population of nearly five hundred families, and does a prosperous fair business, while Watzetan, with under one hundred families at present, is known throughout the region for its extreme poverty which forces many of the village men to seek a living in outside areas.

In Kweichow, however, where less prosperous conditions have long existed, the fair not only does exist on a two-day-in-ten pattern, but actually seems more suited to the needs of the country people who have less to sell and are thus less able to buy.

Once established the village fair requires no particular supervision or direction. So long as district patronage continues it is self perpetuating, and patronage will continue so long as there is a market for local produce. Since the dates of future fair meetings are fixed long in advance, in ordinary conditions the success of the fair depends upon the whole population rather than upon any committee of management. As there is no expense of operation, management, or promotion there is no specific organization in charge of the fair. There is an income obtained from fair business in the form of taxes on sales of certain produce. The amounts of this income, and the produce upon which the tax is assessed, vary from village to village though the principle is generally the same. The tax is collected by the office of the *lien pao chu jen* "district head man," which is located in every village. The income derived is at the disposal of the village elders and is used for maintaining the *lien pao chu* office, repairing the village street or temple, subsidizing the temple or the local school, or performing other local public works. Since not every farmer who brings to market a few cabbages, a chicken, or a bit of kindling wood can be effectively taxed, the assessment is made on certain products only. Pigs for butchering and sale during fair day provide a feasible form of tax the burden of which spreads fairly evenly over the populace. Likewise reaching everyone is a tax upon the principal grains, wheat, rice, and corn, as well as occasionally upon peas and beans. Sometimes villages with other specialties may include them in the list of taxable commodities if such assessment is practical.

As there is no supervision of the fair each and every seller can pick his own location from which to dispose of his wares, or he may join the milling crowd in the street and go seeking a buyer. For many products there is no zoning of commodity selling to be found. For many others there seems advantage in zoning, and a generally applicable system has developed. The grains section in some ways is the most important unit of their fair and usually is to be found in the court of the village temple or in some other small clearing if the temple has no court. (The village temple at Wangtsunchang now is occupied

FIGURE 5.—The temple court at Chinshansze on fair day is filled with grain sellers, whose awnings ward off the summer sun. The theater stage is at the left and lining the court is the audience balcony.

by the Salt Administration office and public storehouse, and thus is not available for fair use. A small clearing recently has been made fronting on the village street, and this is now used by the grain dealers on fair days and is a basketball court and military drill ground on other days.) Figure 5 shows the temple court at Chinshansze in which the sellers of grains, peas, and beans are always to be found. Only those selling larger amounts can gain access to the small space, and those who may bring only two or three pounds to barter for some other product may occasionally dispose of it on the street and thus escape the tax assessment. Firewood usually is to be found in one location, as are small pigs and goats sold for fattening. Sometimes the green vegetable sellers line up together

FIGURE 6.—The village street of Wangtsunchang on a non-fair autumn morning is relatively empty and the dogs and chickens have free run of the street. This village has a wide covered sidewalk upon either side of the street which is occupied by peddlers on fair days.

at one point, while in autumn the sellers of sweet potato tops usually gather together to attract buyers. Often there are oil shops located near the outskirts of villages. Particularly those upon the outskirts line their counters and tubs with hooks upon which the customers hang their jars and bottles as they enter the village. Here they can easily be picked up on the way home. Among the sellers of processed and manufactured goods no zoning or grouping is observable. Tea shops and eating houses, general goods stores, butcher stalls, medicine shops, tobacco stalls, pottery shops, and smithies are scattered throughout the whole of the village street, and among them equally scattered are the sub-let stall spaces of the itinerant peddlers of salt, sugar, medicine and charms, baskets, pottery wares, brasses, textiles, and small fabricated products. Sometimes these sub-let stalls take up all the frontage of house units, the dwellers of which may temporarily be taking no selling rôle in the fair or who may be engaged in an enterprise which does not require street-front display and stock space. At other times peddlers may occupy front corners of shops, or may find some bit of space for which no rent is required. The street itself can be occupied without charge, but unless the street is of more than ordinary width it is usually greatly overcrowded with fair goers. Rent is customarily paid in produce or goods, though the country folk selling farm produce usually avoid positions that require hired space.

ROUTINE AND BUSINESS OF A FAIR

Since the fair is a periodic event with little business turnover occurring on non-fair days there is a rhythmic change in routine that often is very striking. On non-fair days the villages are relatively empty and in some a large number of houses and shops are shut up tightly while their owners are occupied elsewhere (Figure 6). In travel in rural Szechwan at all seasons the writer often has found it extremely hard to get more than plain rice at a meal or to buy many of the commonest of articles if it chanced to be one of the days between fairs. Throughout a district on non-fair days few people are to be seen

FIGURE 7.—This main road just east of Wangtsunchang is crowded with country folk all bound for the fair.

on the paths and roads, but in the fields and about the scattered farmsteads everyone is busy at some task. On the morning of a fair in a given village all near-by paths and roads are crowded with a steady flow of country folk and itinerants bearing all manner of goods (Figure 7). (The writer has formed an estimate that throughout a year every other family is represented by at least one member at every fair of their district village.) The actual products vary somewhat with the seasons, but always there are the itinerant peddlers and always there are vegetables to be seen. Innumerable small baskets and sacks hold small quantities of winter-grown peas, beans, and wheat, or summer rice, corn, or millet. In summer and autumn the fruits and sugar cane flow steadily into the villages in small quantities, and in the autumn, too, sweet potato tops fill huge baskets while the tubers are retained at home for food. (Chopped potato tops, mixed with moist bran, are used by villagers as a fattening food for pigs in the autumn.) Some products show no great seasonal variation, coming from work during farm leisure hours or from the labor of women, children, and family elders. Straw sandals, bamboo baskets, grass rakes, wooden farm-tool fittings, firewood, and other like products may be seen the year around streaming into the villages on fair mornings. The fair goes by the sun and in summer the crowd begins arriving in force by seven o'clock, while in winter the hour is no earlier than nine. Similarly are the evening hours extended and shortened.

In the village itself there is only a moderate amount of preparation made during the intervals between fairs, for there is little to do with. The blacksmith is perhaps the busiest man in the village between fairs, but even his work on grass cutters, plowshares, hoes, and the like is without display of enthusiasm and show. Early on a fair day the village is awake and in readiness; even before the first comers appear there is a bustle that is entirely absent on other days. As the people arrive the noise and bustle increase. At full height the street and any free space are filled with a noisy milling crowd of country people occupied either in mock quarreling over

prices or just milling about looking for friends, goods, or a buyer. There is a steady surge of traffic back and forth in the street as the people on vacation from their labors indulge in loud participation in the fair (Figure 8). In the tea shops and eating houses one meets the climax of boisterousness. To the Chinese from other provinces the crowded Szechwan tea shops seem a symbol of laziness. To the rural Szechwanese an hour in a tea shop on fair day, drinking, smoking, and gossiping, takes the place of a more costly and sophisticated form of amusement. A cup of tea costs but a copper and there will be endless hot water supplied at no extra charge. If one has made a good sale a few delicacies and a pot of wine for one's friends are easily had for a small charge. It is in the tea shops and restaurants on fair day that news spreads far and wide through rural Szechwan. The Szechwanese tea shop waiter is perhaps the noisiest waiter in the world.

To the villagers the foremost purchases on fair day are vegetables, pork or goat meat, fowl, eggs, and firewood. A share of these are for the villagers' own private needs during the coming interval but the bulk goes to the eating houses that will feed the throng of visitors during that one day. In a large market village the total of this form of produce consumed on the spot during the day amounts to a considerable volume. During the summer months the daily transactions during a fair may total two thousand dollars silver for the average prosperous village of two or three hundred families attracting a fair gathering upwards of a thousand people. A few villages average more than this, while on the other hand at the usual nine-fair-per-month meeting

FIGURE 8.—A wide section of the street of Ankuochang on fair day is taken up by portable kitchens and peddlers' stands. At the lower right is freshly harvested wheat drying on bamboo mats. This view is taken early on a spring morning before the main crowd has arrived.

in some small twenty to forty family village the turnover may rarely exceed a hundred dollars per day and the fair will be acknowledged a small and poor one. Most of the transactions are of a few cents each, and only occasionally does business take place with a valuation above a few dollars per transaction. The needs of the country people are simple and normally they take to market only enough produce to barter or sell for their wants of the moment. A few feet of cloth for a garment, oil for light for a few days, an iron tool, some pork or brown sugar for a feast or a special treat, medicine for a sick family member, a new brass pipe bowl and a bit of cheap tea for general family consumption, a couple of needles and a thimble, a tooth pulled by an itinerant dentist, a charm for a new baby, a silver bracelet for the wife as a means of laying by a bit of wealth which can be sold in time of need, these and other such simple items, one or two each fair day per family, make up the business. Out of the proceeds of his double basket of green vegetables a lad may gamble a copper on a wheel of chance seeking to win a prancing horse wrought in brittle brown string-candy (Figure 9), or a farmer may sell a few pounds of beans to get money to pay a professional scribe to write a letter, then to secure the advice of a fortune teller concerning the building of a new unit onto the family home, buy two or three bright candy balls for a favorite grandchild, and a bit of powdered tobacco for his own homemade bamboo water pipe. A villager owning a medicine shop may buy a cheap pair of cotton socks and cloth shoes for special wear, his wife will haggle long with an itinerant peddler for a bit of braid and a few foreign type buttons for a superior new garment, while his school semi-educated son may even extravagantly buy a Shanghai-made visible ink-barrel fountain pen for twenty cents of the same peddler. (The writer bought such a pen of a peddler at a small village fair during the summer of 1937, but three or four years after their introduction upon the metropolitan American market. That such cultural devices can spread so thoroughly throughout the rural districts of western China in so short a time is in part attributable to the itinerant peddlers of manufactured goods. Many other kinds of occidental manufactured goods can be had of the rural peddlers at astonishingly cheap prices.) A small buyer of wood oil nuts may also be selling some crude brown sugar bought in the city to which he took his last lot of oil nuts, and next him may be a salt peddler wrapping small sales in big green leaves that he obtained from a farm girl in exchange for a half pound of salt. Having sold a fat pig and some rice at good prices a prosperous farmer may take half the price of the pig in cash from the butcher to outfit the family with another layer of cotton garments for winter, leaving the balance with the butcher towards the later needs of his son's coming marriage. Two big baskets of sweet

FIGURE 9.—This little village girl has just lost a copper on a game of chance. Had she won she could have had her choice of the candy horse-and-rider, the fancy rooster, or the fat fish stuck in the lower left part of the straw holder. This fellow is an itinerant whom the writer has seen at a half dozen different villages in northern Chienwei county.

potato tops may bring an old woman enough to buy a new hoe blade with which to dig the potatoes and some seed to plant the same ground in winter wheat. An old grandfather who no longer works in the fields bargains long with a shopman over the sale price of a lot of straw sandals he has finished while directing his sons in the general farm work, and goes for a while to his favorite tea shop to sit in a corner with a few cronies and watch the fair in the street. These are the transactions that make up the body of the village market-fair in hundreds of villages throughout the province.

POPULATION OF QUEBEC PROVINCE: ITS DISTRIBUTION AND NATIONAL ORIGINS

H. Harry Lewis

THE physical conditions of Quebec and the dual national origins of its population have resulted in a settlement pattern which differs significantly from that of the rest of Canada. An interpretation of the present distributions cannot be undertaken without a consideration of the peopling of the region since Champlain's initial settlement at Quebec in 1608, for the province has been settled by two different national elements and at different periods of time—French down to 1763, and afterwards British—each with different types of land tenure, and at first in separate but adjacent areas.

During the French regime in Canada settlement was almost entirely confined to that part of the St. Lawrence Valley between Montreal and Quebec in which the existence of a lowland strip of marine clays suitable for cultivation along the margins of the river offered more favorable conditions than either the generally infertile Laurentian Plateau to the north or the Appalachian Highlands to the south. The thick forests which covered the whole region away from the St. Lawrence, together with the fact that the river was the main line of communication both within the region and with the mother country, were also important determinants of the areas of early colonization. In the earliest period, the continuous cold and heavy snowfall of the winter months made the establishment of any permanent settlements difficult. Thus, of the twenty-eight settlers who wintered at Quebec in 1608–1609, seventeen died, but it was not the absolute severity of the winter but the element of unexpectedness that led to this disaster. The climatic conditions afforded the settlers only a very limited time wherein to till the ground and raise their crops. This was followed by a long close season which later offered an opportunity for greater participation in religious festivities. The latter circumstance appears

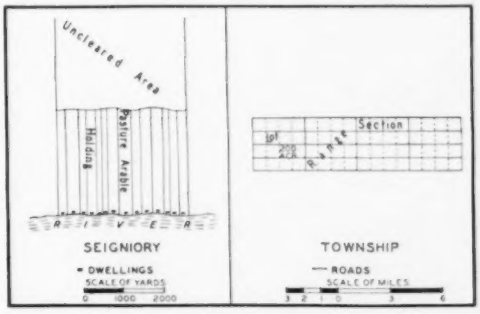

FIGURE 1.—A French seigniory and a British township. The seigniory was constructed from information in Knowles, L. C. A., *The Economic Development of the British Overseas Empire*, Vol. II, London, 1930, p. 181; Lucas, C. P., *A Historical Geography of the British Colonies*, Vol. V, Part III, Oxford, 1911, p. 125; and Newbigin, M. I., *Canada; The Great River, the Lands, and the Men*, 1926, pp. 106–109. The township is after Lucas, C. P., *A Historical Geography of the British Colonies*, Vol. V, Part III, Oxford, 1911.

to have been significant in establishing the strong social ties between the "habitant" and his church which have enabled the French Canadians to maintain their individuality despite the later change in political allegiance, and assisted them in extending their range of settlement. The fisheries and the fur trade were supplementary means of exploiting the resources of the region, and although profits to be obtained from the fur trade were an incentive for the more adventurous of the French to

move out of the permanent settlements the trade was also an important factor in the growth of Three Rivers, as the first base of the western fur trade, and Montreal, situated farther west at the meeting place of the main fur trade routes. Until 1663 the menace of the Iroquois Indians was an obstacle to settlement in the St. Lawrence Lowlands above Montreal. But defence and counter attacks were organized in the early 1660's and comparative security attained after 1665.

entirely largely because Canada played little part in the general policy of France and more important matters claimed attention. The fact that in 1760 New France, nevertheless, had a population of 70,000 indicates the importance of the high natural increase of French Catholics in growth of population.

By the end of the French regime there were three cities in Canada—Quebec, Three Rivers, and Montreal—founded in 1608, 1634, and 1641 respectively. Quebec, founded for strategic reasons

FIGURE 2.—The village of Petit Metis on the southern shore of the St. Lawrence showing typical French Canadian settlement and particularly the alignment of the village along a road parallel to the river with the holding strips running inland at right angles to the St. Lawrence. (Department of Lands and Forests, Quebec.)

During the twenty years following Champlain's foundation of Quebec, immigration to French Canada was very small and as late as 1629 only five families aggregating twenty-five persons occupying twenty acres of land were settled in the colony. Even by 1663 there were only 2,500 settlers in Canada, but in that year the area became a Royal Province and systematic transport of large numbers of immigrants began with the result that ten years later the population had risen to 6,705. But from 1672 until the end of the French regime immigration again ceased almost

and an important link with France, had a population of 4,820 persons by 1739. Three Rivers was both a missionary and commercial settlement but its growth was arrested and temporarily declined when the greater advantages of Montreal's position as a center for fur trade began to take effect. Thus its total of 411 inhabitants in 1739 was a decrease of 50 from the 1666 figure. Montreal with 4,331 people in 1739 was founded as a missionary settlement but soon became the base of operations against the Iroquois and the chief market of fur traders.

Settlement of Canada was in the nature of an expansion from these three main centers and was planned on a modified feudal system. Large estates (or seigniories) were created, the seignior granting much of his land to vassals who paid rent in money or in kind. The Seigniory of Beaupré, for instance was 48 miles long and 18 miles deep, the long side being along the Great River to as time passed the holdings were divided among members of the individual households, subdivisions also usually ran longitudinally so that each family retained an outlet to the river and a section of each of the different zones of land—arable, grazing, and forest. The general similarity of conditions along the St. Lawrence banks also meant that the mode of life was everywhere broadly

FIGURE 3.—An Eastern Townships settlement in the Memphremagog district showing the undulating and wooded nature of the Appalachian hills. (Courtesy of National Museum of Canada, Ottawa.)

the northeast of Quebec city. The actual arrangement of peasant holdings within the seigniories showed a definite response to the natural conditions. They were laid out in long narrow strips running backwards from the river bank, each strip being normally 260 by 2,600 yards. The rivers formed the main, and for long the only, thoroughfare both for civil and military traffic and the river frontage gave each holding access to a highway without the heavy cost of road construction, while the narrow width of each was a device to promote continuous settlement. When, the same. In each holding the dwelling tended to be placed near the river bank and had around and behind it the arable area, while farther back were the grazing lands for stock animals, pasturage increasing as trees were progressively removed. Behind the pasture lands was the uncleared area which yielded fuel, building material and, to some extent at least, a money crop in the shape of timber. (See Figure 1.)

But distinct from these were conditions in the area drained by the Richelieu and neighboring rivers such as the Yamaska and the St. Francis. Here,

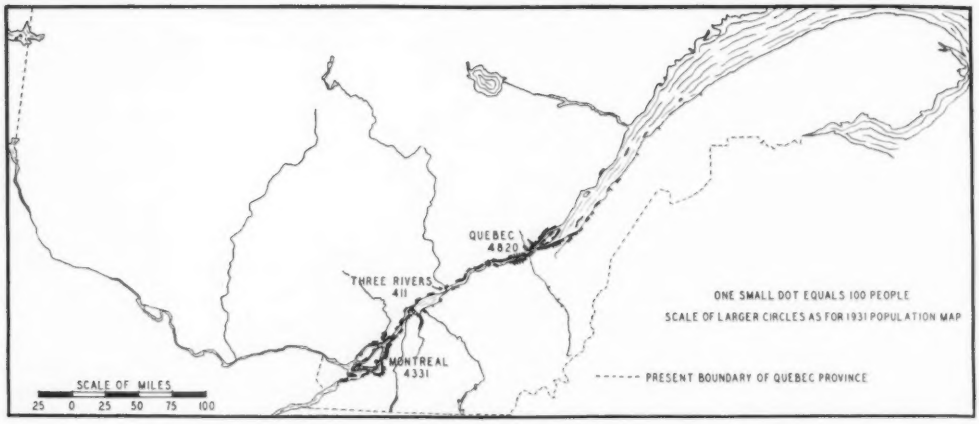

FIGURE 4.—Distribution of Population, New France, 1739. Mapped from Census Data for 1739 supplied the author by the Dominion Bureau of Statistics, Ottawa. Localities mentioned in that Census obtained from Sauthier, C. J., *A Map of the Inhabited Part of Canada*, London, 1777.

lands capable of cultivation and settlement existed away from the St. Lawrence River banks in undulating country containing much rich land. Before 1763, however, the French either failed to discover that settlement was possible in these areas, or if, as is more likely, they knew of the possibilities, they did not attempt to act upon their knowledge save in a few restricted areas on the Richelieu and Chaudière Rivers.

A road was completed between Montreal and Quebec early in the eighteenth century and it soon came to resemble a straggling village street. By 1763 there was a line of settlement from Les Eboulements to Soulanges on the left bank of the St. Lawrence, while on the south bank habitations extended, although not as continuously as on the north, from Chateauguay to Cap Chat.

Soon after the British conquest of Canada there were important developments in the peopling of the province. The St. Lawrence River frontages became fully occupied as population increased so that there was colonization of the lands behind and migration elsewhere. The new settlement areas included that known as the Eastern Townships, a potentially rich stock-raising and farming country, which lay between the St. Lawrence and the American border, and the Western Townships along the left bank of the Ottawa River. There were also movements into the restricted lowlands between the Appalachian Mountains, the Lower St. Lawrence River and Chaleur Bay and later to the Laurentian Plateau. Here some areas of marine or lacustrine sediments as in the tectonic depression around Lake St. John (which attracted settlers first in 1851) and the Clay Belt region of Abitibi and Temiskaming (settled mainly within the last thirty years) have ameliorated the usual negative characteristics so that farming after clearing becomes possible. The building of new roads and railways after 1836 facilitated the colonization of new areas and gave an impetus to growth of older centers.

During the present century a further stimulus to growth and expansion of the population has been the industrialization of southern Quebec. This industrialization has depended on development of hydro-electricity which has furnished cheap and abundant power in the absence of any coal resources, on discovery of mineral resources such as those in the Rouyn and Noranda

districts, and also the more intensive exploitation of minerals such as the asbestos mines of the Eastern Townships which received comparatively little attention during the nineteenth century.

During the last half of the eighteenth century the old seigniories were reclassed or grouped into counties and they survived unchanged as the basis of land holding. Townships, however, were new entities established by the British in Canada. These were established subsequent to 1795 in the country behind the already existing seigniories from which they differed markedly in plan, being rectangular or square tracts varying between 20 and 144 square miles in area. Figure 1 shows a township with an area of 36 square miles and traversed by two sets of roads. Further lines divide it into 200-acre lots, each block of four lots being called a section, and four vertical sections a range. The advantage of the system was that township dovetailed into township and continuity was secured in clearing and road-building, not merely along one front as in the seigniories but along every front and between holdings, for each lot had at least one road fronting it.

In strong contrast with the French regime the immigrants were almost entirely of British national origin for the first hundred and thirty years or so of British occupation of Quebec Province. (The insignificant influence of French immigration is shown by the fact that in 1851 only 359 of the total population of the Province had been born in France; . . . *cf.* Vivien de Saint Martin, M. Nouveau Dictionnaire de Géographie Universelle, Tome Quatrième, 1890. Paris, p. 1029.) This has not remained true during the present century but immigrants of British national origin have still been in the majority in the decennial returns. In 1763 at the conclusion of the Seven Years War all the French officials left the region as did many of the fur traders, a quarter of the priests, and many seigniors whose places were taken by British who also bought

FIGURE 5.—Rouyn mining settlement—a typical township on the Laurentian Plateau. (Courtesy of Department of Mines and Fisheries, Quebec.)

up new land. But French "habitants," on the other hand, showed little concern at the change of government and continued to cultivate their holdings. In 1764 a number of immigrants from Jersey and Guernsey established themselves on the eastern coast of Gaspé. A result of the American Rebellion was to bring 40,000 United Empire Loyalists to Canada between 1777 and 1784 but of these only 5,576 had settled in Lower Canada (as Quebec Province was later called) by the latter date, the remainder, for the most part, going to Upper Canada (Ontario), New Brunswick, and Nova Scotia. It should be noted that the division between the dominantly English and French parts of Canada into Upper and Lower Canada respectively in 1791 reflected difficulties in adjusting relations between the two national elements. During the next few decades American immigrants entered the region between the French districts and the American border and larger numbers of British immigrants settled in Lower Canada, but these latter were only "the residue of the westward moving multitude."

During the Rebellion of 1837 and the following depression there was considerable anxiety in French speaking Canada about the prevailing emigration of French Canadians to the United States. But very soon, under the guidance of their priests there was a movement of the French Canadians towards the Eastern Townships, and later to the more distant settlements in the Lake St. John and Temiskaming districts. A factor in this settlement was political jealousy of the success of the English in Upper Canada in settling their backlands. Important also was the fear of an English predominance unless Lower Canada could retain her own French population. In the 1870's and 1880's ineffective attempts were even made to attract immigrants from France and Belgium.

FIGURE 6.—The Lake St. John–Saguenay towns of Jonquiere and Kenogami. (Courtesy of Department of Lands and Forests, Quebec.)

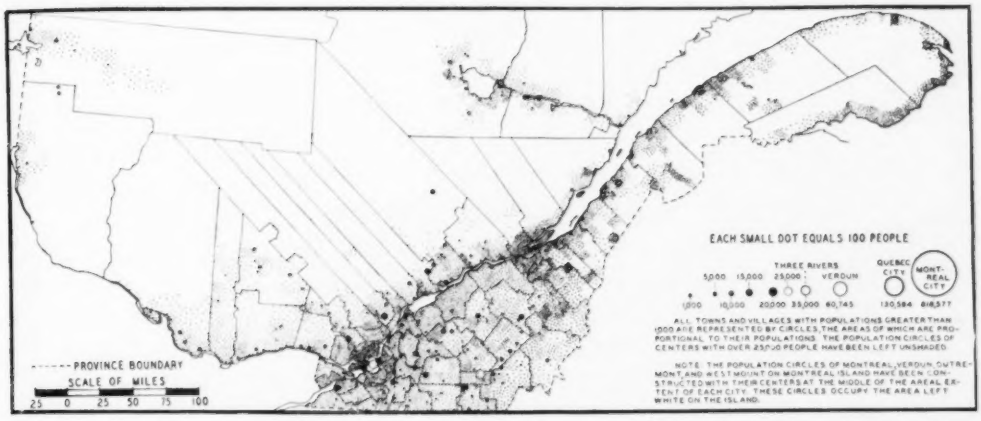
EACH SMALL DOT EQUALS 100 PEOPLE
THREE RIVERS
VERDUN
QUEBEC CITY
MONTREAL CITY
5,000 15,000 25,000
1,000 10,000 20,000 35,000 60,745 130,594 618,577
ALL TOWNS AND VILLAGES WITH POPULATIONS GREATER THAN 1000 ARE REPRESENTED BY CIRCLES, THE AREAS OF WHICH ARE PROPORTIONAL TO THEIR POPULATIONS. THE POPULATION CIRCLES OF CENTERS WITH OVER 25,000 PEOPLE HAVE BEEN LEFT UNSHADED.
NOTE: THE POPULATION CIRCLES OF MONTREAL, VERDUN, OUTREMONT, AND WESTMOUNT ON MONTREAL ISLAND HAVE BEEN CONSTRUCTED WITH THEIR CENTERS AT THE MIDDLE OF THE AREAL EXTENT OF EACH CITY. THESE CIRCLES OCCUPY THE AREA LEFT WHITE ON THE ISLAND.
PROVINCE BOUNDARY
SCALE OF MILES
25 0 25 50 75 100

FIGURE 7.—Distribution of population, Quebec Province, 1931. Population statistics from Seventh Census of Canada, 1931, Vol. II, Table 12. The data are plotted on a township basis, the boundaries of these subdivisions of counties being obtained from Ministere des Terres et Forets, Quebec, Carte Officielle, Quebec, 1935; Department of the Interior, The Canada Atlas, Ottawa, 1906 and 1916 editions; and Standard Topographical Maps, Ottawa, 1929.

After 1860 immigration fell off owing to political unrest in Canada and the competing attractions of Australia, New Zealand, and the United States, but the first fourteen years of the present century saw a tremendous increase in the number of immigrants to Canada, at first mainly to the Prairie Provinces. Immigration to Quebec Province reached its maximum in the fiscal year 1914 but after the War the strictly selective policy of the Department of Immigration greatly reduced the movement of settlers to Canada as a whole as well as to Quebec. During the fiscal years 1914 and 1919, for example, Quebec received 80,368 and 6,722 immigrants, respectively. With the depression which began about 1929 further limitations were applied which resulted in a corresponding decrease in newcomers to the Province. In the present century there has been some revival of French immigration but the majority of the

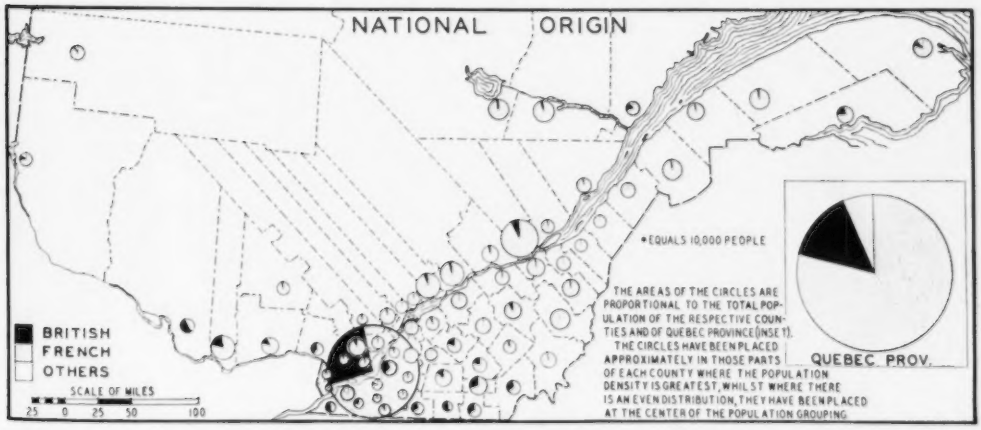
NATIONAL ORIGIN
•EQUALS 10,000 PEOPLE
THE AREAS OF THE CIRCLES ARE PROPORTIONAL TO THE TOTAL POPULATION OF THE RESPECTIVE COUNTIES AND OF QUEBEC PROVINCE (INSET). THE CIRCLES HAVE BEEN PLACED APPROXIMATELY IN THOSE PARTS OF EACH COUNTY WHERE THE POPULATION DENSITY IS GREATEST, WHILST WHERE THERE IS AN EVEN DISTRIBUTION, THEY HAVE BEEN PLACED AT THE CENTER OF THE POPULATION GROUPING.
QUEBEC PROV.
BRITISH
FRENCH
OTHERS
SCALE OF MILES
25 0 25 50 100

FIGURE 8.—National origins of the population, Quebec Province, 1931. Statistical data from Seventh Census of Canada, 1931, Vol. II, Table 32. National origin by which ultimate European origin is generally meant, is usually traced through the father, but the issue of marriages between white and colored peoples are classed as Negro, Mongolian, etc.

FIGURE 9.—Quebec City with satellite towns on adjacent riverine plain and the Laurentian Plateau in the background. (Courtesy of Canadian National Railways.)

new arrivals have been of British origin. Thus, of the 220,000 immigrants who entered the Province during the first thirty years of this century and were still resident there in June 1931, only 14 per cent were French.

There has been some emigration loss from Quebec to the United States and to other parts of Canada but no record of this is obtainable. It can, however, be illustrated by the fact that of the 710,000 immigrants who entered Quebec Province between 1901 and 1931 only 220,000 were living there in June 1931. So great a reduction cannot be entirely due to death. If in connection with the above it is noted that during the same period the total population of the province increased by nearly one and a quarter million persons there is still a considerable balance even when a substantial allowance is made for the entrance of people to the province from other parts of Canada which must be due to a high rate of natural increase. The French Catholics whose families commonly number as many as twelve persons constitute a high percentage—79 per cent in 1931—of the total population and account for the high birth rate which this implies. A comparison of the population distribution maps for 1739 and 1931 shows a great increase in the total population of the province during the intervening period and an expansion into districts away from the immediate neighborhood of the St. Lawrence between Quebec and Montreal to the Eastern Townships, the Ottawa River Valley, the new regions of the Laurentian Plateau and the shores of the St. Lawrence Estuary. Many urban agglomerations have sprung up but the prominence of Quebec and Montreal has increased. Montreal with greater commercial and industrial advantages had a population of 818,577 in 1931 or 28 per cent of the total population of the province.

Although French immigration practically ceased from 1672 to 1900 the proportion of French Canadians has nevertheless increased steadily during the nineteenth century in spite of both British immigrants and the exodus of some French Canadians to other parts of the continent. During the present century the percentage of the total population of people of French national origin has remained practically stable, being 80.7 per cent in 1901 to 79 per cent in 1931, despite the revival of French immigration.

People of French and British national origins accounted for over 94 per cent of the 1931 population of 2,874,255 but the proportions of these dominant elements have, in most areas been progressively altering in favor of the French who are today in the majority in the greater part of the province and especially those counties adjacent to the St. Lawrence River from Beauharnois to Matane and from Soulanges to Saguenay. These are regions which had been first colonized during the French regime or by French Canadians at a later date. This is also the case in the Temiskaming, Lake St. John, Saguenay and Abitibi districts. British Canadians are more in evidence in the larger towns and cities, the Eastern Townships, and certain isolated counties. The Eastern Townships district has a comparatively low percentage of inhabitants of French national origin, but there are variations within the district. The table below shows these variations in two of the counties and also serves to illustrate the increasing proportion of French Canadians in all counties of the Eastern Townships since the middle of the nineteenth century:—

FIGURE 10.—The metropolis of Montreal. (Courtesy of Department of Trade and Commerce, Ottawa.)

County	Percentage of Total Population of French National Origin			
	1851	1881	1911	1931
Brome.....	13	31	38	45
Megantic.....	53	68	86	92

To the west of the Eastern Townships and south of the St. Lawrence the general predominance of the French is interrupted by Huntingdon County which has only 48 per cent of its population of French national origin. Again, Pontiac County north of the Ottawa River has a British Canadian majority, while Argenteuil and Hull have taken the same trend as most other counties. This reflects the early British settlement of these areas followed at a later date by a movement of French Canadians into adjacent districts and also the partial substitution of British by French when the former were attracted elsewhere. The relatively high percentage of British Canadian population of Gaspé and Bonaventure results from the initial settlement of the Gulf Coast region by immigrants of British origin including a proportion of the United Empire Loyalists.

Throughout the history of settlement in Quebec Province the most prominent features are the repellent effect of the Laurentian Shield and the dominance of the French element in the composition of the population. The Shield has, with two major exceptions, long confined settlement to the St. Lawrence Lowlands and the Appalachian valleys while the presence of the St. Lawrence River has been of primary importance both in the successful settlement of the province and as an artery of trade and commerce to which Montreal and Quebec are most indebted for their growth. Few immigrants of French national origin have arrived since the British acquisition of Canada and the fact that French Canadians comprise nearly four-fifths of the total population today indicates the great importance of the high natural increase of the Catholic elements of the population. The distinctive feature of the colonization of new areas in Quebec Province has been its dominantly internal character. This has been demonstrated in the new settlement areas of the Laurentian Shield. There has also been a gradual substitution of French Canadians for the British in most areas. Finally, where Canadians of British national origin are in the majority they are seldom as dominant as French Canadians usually are in other parts of the province.

Note: The data upon which this article is based are derived chiefly from:

1. Dominion Bureau of Statistics: A Chronological List of Canadian Censuses, Ottawa.

2. Knowles, L. C. A.: Economic Development of the British Overseas Empire, Vol. II, London, 1930.

3. Lucas, C. P.: Historical Geography of the British Colonies, Vol. V, Part III, Oxford, 1911.

DISTRIBUTION OF DAIRY FARMING IN PENINSULAR ONTARIO

J. R. Whitaker

PENINSULAR Ontario has been described by Derwent Whittlesey as an area dominated, in terms of its agriculture, by commercial dairying; and by Richard Hartshorne as an area in which dairying is a minor element in a highly diversified farm system. O. E. Baker has classed the entire area as a part of the Hay and Dairy Belt, which includes all of the Peninsula and stops short at the edge of the Shield. A preliminary field study of the area in 1932 made clear, on the one hand, that significantly large parts of the Peninsula are not dominated by dairy farming; and, on the other hand, that there are at least two centers in which that type of farming is clearly dominant. Further investigations, including several weeks of field study, yielded definitive conclusions regarding the distribution and intensity of dairying and its relative importance in the farm economy.

The geographic significance of this question rests in part on the prominence of the industry as a key phase of land use and rural economy in this, one of the more populous regions of Canada, and on the influence of dairying on the trade and political relations of Canada with the United States, with other parts of the British Empire, and with the rest of the commercial world. A third consideration is the place of this area in the world pattern of dairying and of agricultural types.

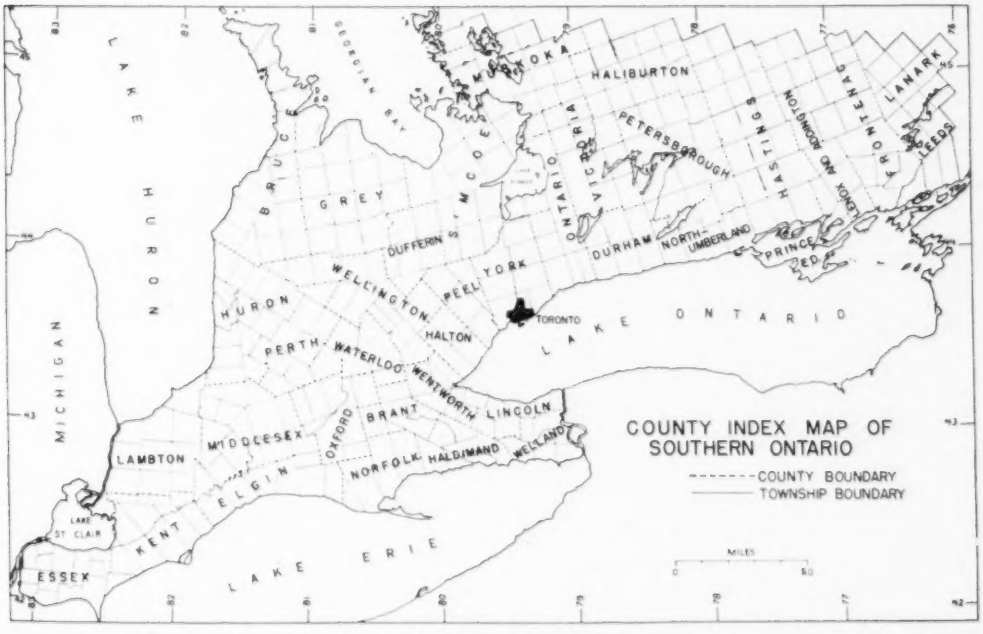

FIGURE 1.—Note the location of Oxford, Lennox, and York counties, leading counties in dairy farming. The close statistical grill furnished by townships aids in the location of critical land-use gradients.

AREAL DISTRIBUTION AND INTENSITY

The areal distribution and intensity of dairying is indicated by various measures, of which we select the following:

1. Work buildings and herds—field evidence.
2. Milk-processing plants.
3. Number of cows in milk or calf per square mile of farm land.
4. Gallons of milk per acre of all land.

discharging platforms for loading cans of milk on wagon or truck are found beside the road at almost every farm house; but in southern Lambton, dairy buildings are few, and dairy cows seem to be in sufficient numbers to meet home needs only.

The location of milk-processing plants gives, likewise, an indication of distribution but is of little value as a measure of intensity, except in a very approximate way (Figure 2). Here, as in the dis-

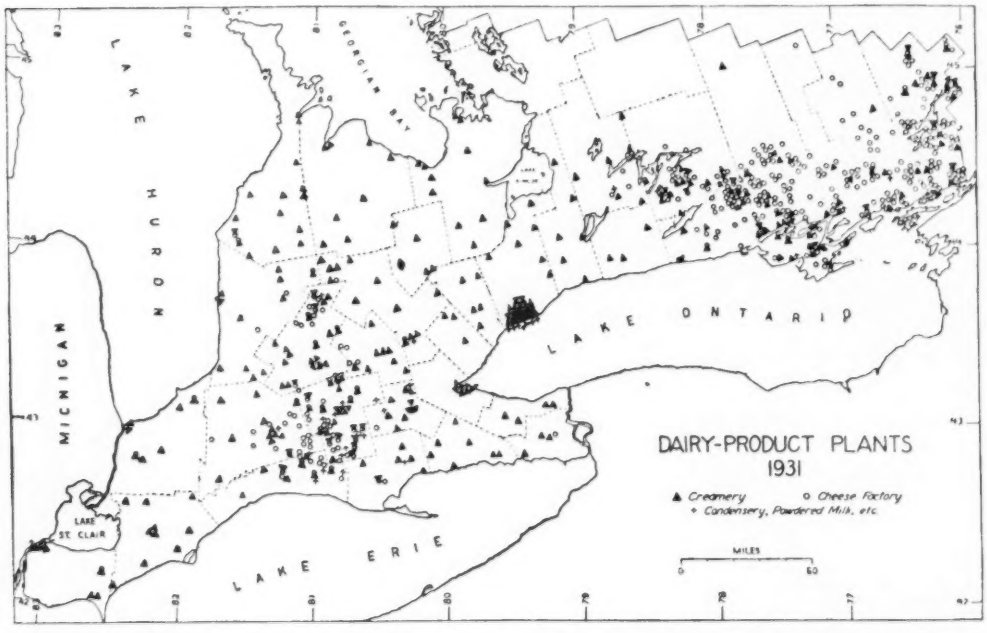

FIGURE 2.—Of the various types of dairy-product plants, creameries are most widely distributed. Cheese factories are rather sharply concentrated in two districts. Incidentally, the cheese areas very nearly mark out the leading dairy districts. (Courtesy of *Scottish Geographic Magazine.*)

Wide distribution of dairying over Southern Ontario is evidenced in the presence of dairy herds and of the "work buildings" involved in dairying. Herds of cows and barns with storage space for hay are observed, within short intervals at least, in all parts of the area. On the other hand, notable variations occur. In Oxford County, (Figure 1) there are large barns, and silos on half of the farms; in Lennox County, milk

tribution of easily observable features of the dairy farm, the two districts, Oxford and Lennox, are outstanding (naming each district for a representative county).

The map of density of cows in milk or calf (Figure 3) requires little comment. Note that it is based on township data, and therefore reveals considerable detail. Regional concentration in certain areas is clear.

Closely correlated with the distribution of milk cows per unit area of total land surface is the distribution of annual milk production per acre of all land (Figure 4). From the standpoint of commercial dairying, this is one of the best measures of distribution and intensity. It is, however, less reliable and possibly less accurate than number of animals, being based more on estimates and less on actual enumeration. Moreover, the data for milk are given by counties, and therefore do not admit of very detailed location of isarithms.

In terms of these absolute measures of dairy farming, it is concluded:

(a) Dairying is a commercial enterprise sufficiently developed over the entire Peninsula and well into the Shield to add significantly to the farm income, and to give rise to processing plants in the trade centers.

(b) An area of marked intensity extends from the western interior of the Peninsula eastward to the St. Lawrence Lowland.

(c) Within this more intensive area are two principal centers, one with Oxford County as representative, the other with Lennox. The first is well known in the dairy business as the Oxford area; the other, which I am calling the Lennox, is a part of the so-called Eastern Ontario District, which continues on to include the St. Lawrence Lowland in Ontario. A third center, less intensive but showing signs of considerable vigor, is the area immediately back of Toronto, of which York County is representative.

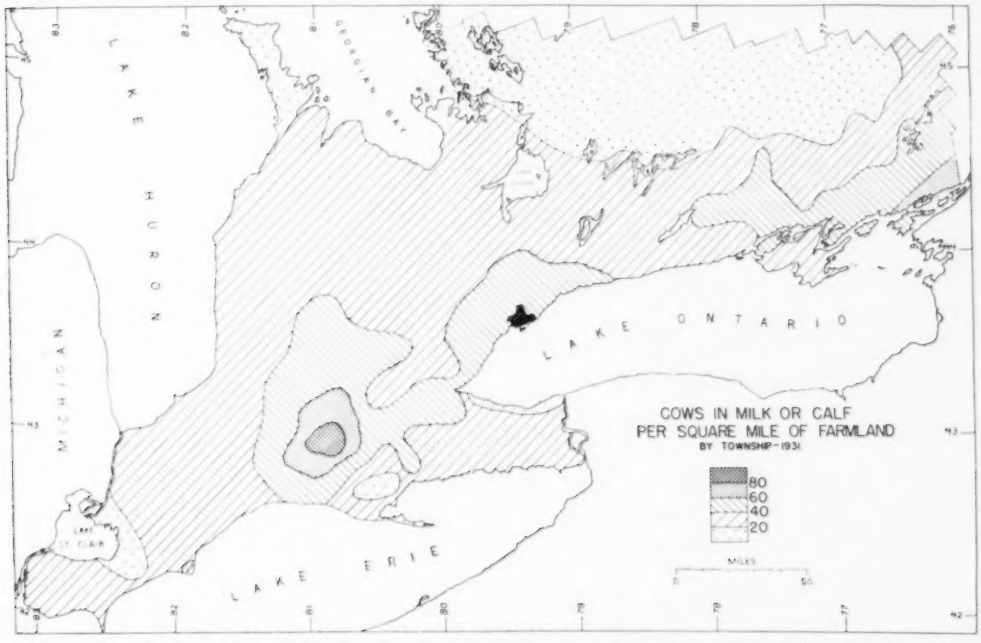

FIGURE 3.—This index to dairy farming is not a perfect one, for many cows in milk or calf are kept primarily as a phase of beef production, and no account is taken, in this ratio, of the yield per cow. Nevertheless, this has proved to be one of the more serviceable indices. The 1931 census was the first for which this information was published by townships.

RELATIVE IMPORTANCE OF DAIRY FARMING

The significance of dairying in the life of the region can be measured not only by density of milk cows, of pro-

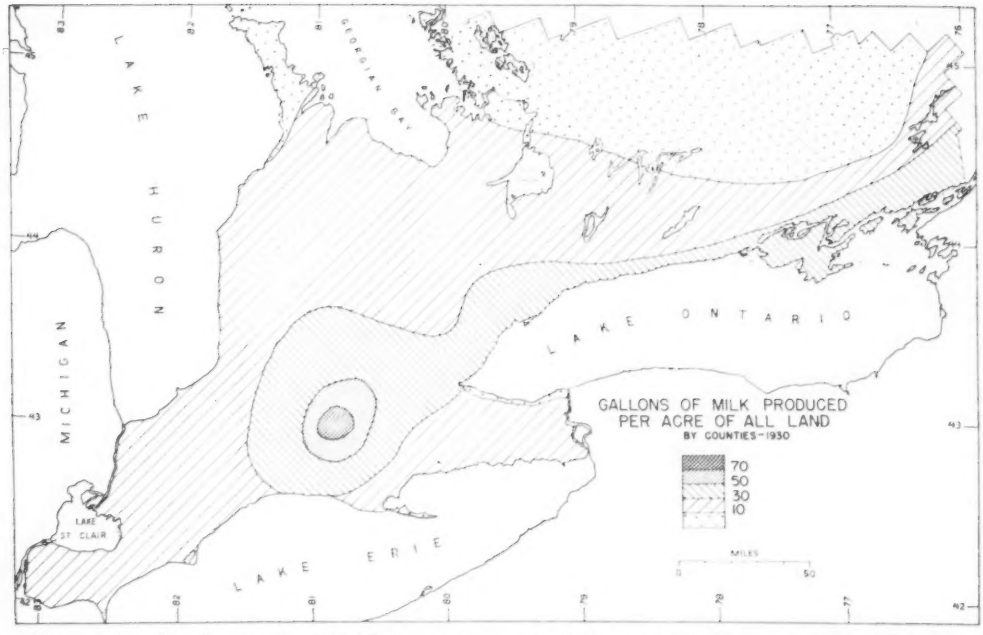

FIGURE 4.—The Laurentian Shield, Bruce Peninsula (between Lake Huron and Georgian Bay), and the Niagara Fruit District are low in milk produced per acre of all land, the first two because of the large proportion of wasteland and woodland, the last because of the dominance of horticulture.

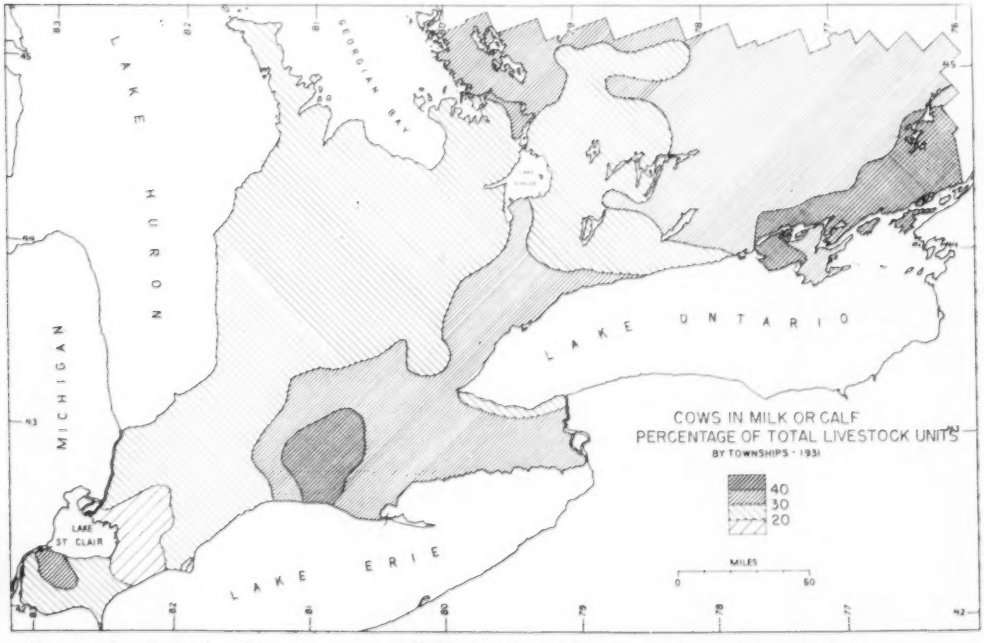

FIGURE 5.—Data for this map were available by townships, hence the greater detail than in Figure 4. The common opinion in Peninsular Ontario that much of that area is "mixed" farming is substantiated by the relatively low ratio of cows to all livestock over large sections.

duction, and of processing plants, but also by relation of dairying to other productive features of farming. Two of the more satisfactory measures available for this purpose, are (1) the percentage of milk cows in the total livestock, (2) the gallons of milk produced annually per acre of crop land.

The map of milk cows in relation to total livestock (Figure 5), indicates in a

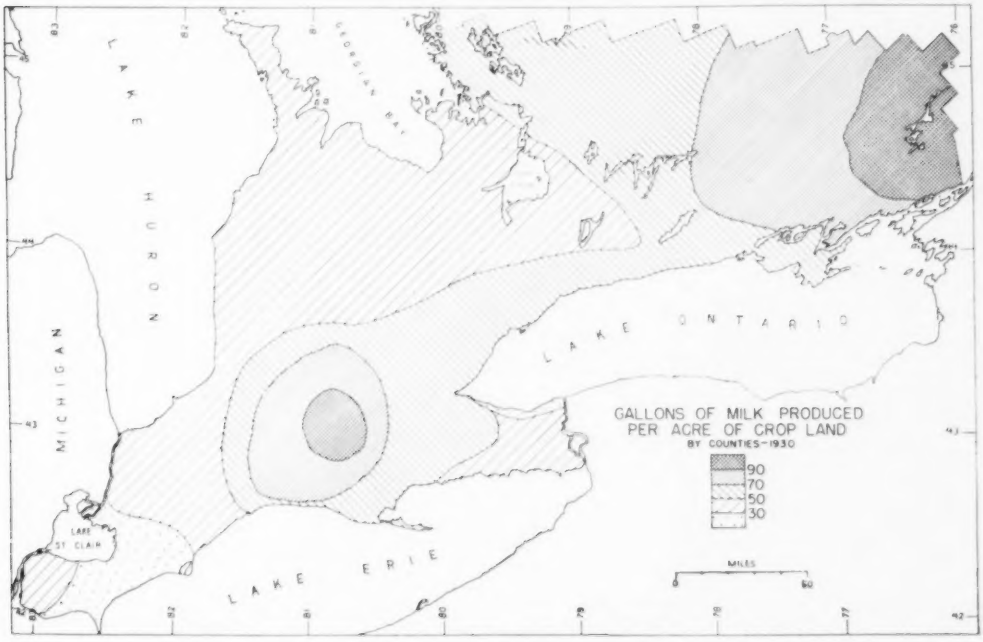

FIGURE 6.—This index to dairy farming has been used with profit in Hartshorne's study of dairying in the United States. A comparison with his map (ECONOMIC GEOGRAPHY, 11, 1935, p. 349) is worth making.

that dairying is probably the dominant element in the farm economy, measured both by land use and by value of products sold, where the annual milk production is greater than 70 gallons per acre of crop land, and the most important of several branches of farming where the ratio is 50 to 70. If 30–50 gallons, dairying is probably less important than other phases of farm production, though there is some surplus; and it is of minor commercial importance if below 30.

comprehensive way the relative importance of the dairy cow. Fortunately, the data required are available for townships.

The number of gallons of milk per acre of crop land (Figure 6), is held by Hartshorne to be a satisfactory index to the rank of dairying in the rural economy of a humid region where tillage tends to be the principal land use (Hartshorne, Richard, "A New Map of the Dairy Areas of the United States," *Econ. Geog.*, 77, 1935, 346–355). Hartshorne estimates, for the United States,

The validity of these statistical distinctions, as applied to Ontario, was tested by comparison with field data. Closely spaced traverses indicated that the isarithm of 50 gallons of milk per acre of crop land per year does mark approximately the boundary where dairy farms become predominant; and the 70 gallons per acre also checks quite closely for the boundary of the area of almost exclusive interest in dairying (the fact

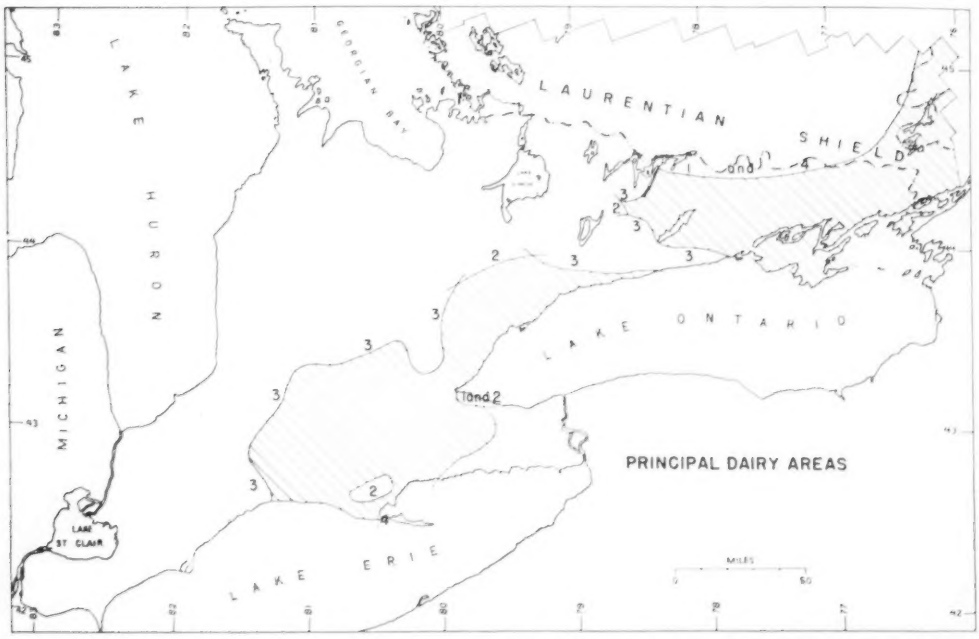

FIGURE 7.—Where high densities and marked specialization in dairy farming coincide. Limiting Isarithms: 1, annual production of ten gallons of milk per acre of all land; 2, fifty gallons of milk produced annually per acre of all land in crops; 3, thirty milk cows in every 100 livestock units; 4, fifty per cent of all land in farms.

that these statistics are for county units makes more than a rough check impossible). The areas below 30 are clearly devoted to other types of farming: grain and fruit in Kent County and vicinity, fruit in the Niagara Fruit District.

To summarize the conclusions regarding the place of dairying in the farm structure and economy:

(1) Areas where dairying ranks highest among the farm enterprises include the Oxford and Lennox districts, with the York occupying secondary rank. The Lennox district clearly extends eastward beyond the area under consideration.

(2) Areas of lowest rank are the Ontario Corn Belt and the Niagara Fruit District.

(3) Certain areas rank high in relative importance of dairying even though low in density of dairy features and production. These include much of the sandy land of Norfolk County and all of that part of the Laurentian Shield included in this survey.

WHERE HIGH DENSITIES AND MARKED SPECIALIZATION COINCIDE

It is clear at this stage in our analysis that there are certain core areas where high densities and marked specialization coincide. To delimit these, districts are selected with index values *above* certain limits (Figure 7):

1. More than 10 gallons of milk produced annually per acre of all land;

2. More than 50 gallons of milk produced annually per acre of land in crops;

3. More than 30 milk cows in every 100 livestock units;

4. More than 50 per cent of all land in farms.

The shaded areas in Figure 7 are the parts of the Peninsula and Laurentian

Border which meet all four tests. The isarithms which form the boundaries are given the same key numbers as those used in this summary (1, 2, 3, 4). Beyond the limits of this area, the values of one or more of these indices drop.

APPLICATION

Now back to the questions raised in the introduction:

Is the Peninsula an area in which dairying is a *minor* element in a highly diversified farm system (Hartshorne, Richard, "A New Map of the Dairy Areas of the United States," *Econ. Geog.*, 77, 1935, p. 350)? No, dairying ranks high by both relative and absolute measures in nearly half the area. In any map purporting to show dairy areas of Canada, of North America, or of the world, these areas of dairy farming (Figure 7) should be so labeled.

Is the entire Peninsula a part of the Hay and Dairy Belt as defined by Baker for North America, and does the northern limit coincide with the edge of Laurentia, as he states, or lie well within it, as his maps seem to indicate? (Baker, O. E., "Agricultural Regions of North America. Part V—The Hay and Dairy Belt," *Econ. Geog.*, 4, 1928, 44–73.) To answer requires consideration of the criteria used to delimit the Hay and Dairy Belt—hay and pasture of greater value than wheat and corn, and farming more important than forest industries. Checking the additional census data called for, it is seen that most of the Peninsula does lie in this region (Figure 8). On the other hand, it is clear that agriculture is more important than forest industries for some distance north of the boundary of Laurentia. The isarithm of 50 per cent of the total land area in farms lies well north of the Laurentian boundary in places. And if the isarithm of 10 per cent of all land in crops and pasture be taken as the limit of the Dairy Belt, it is clear that

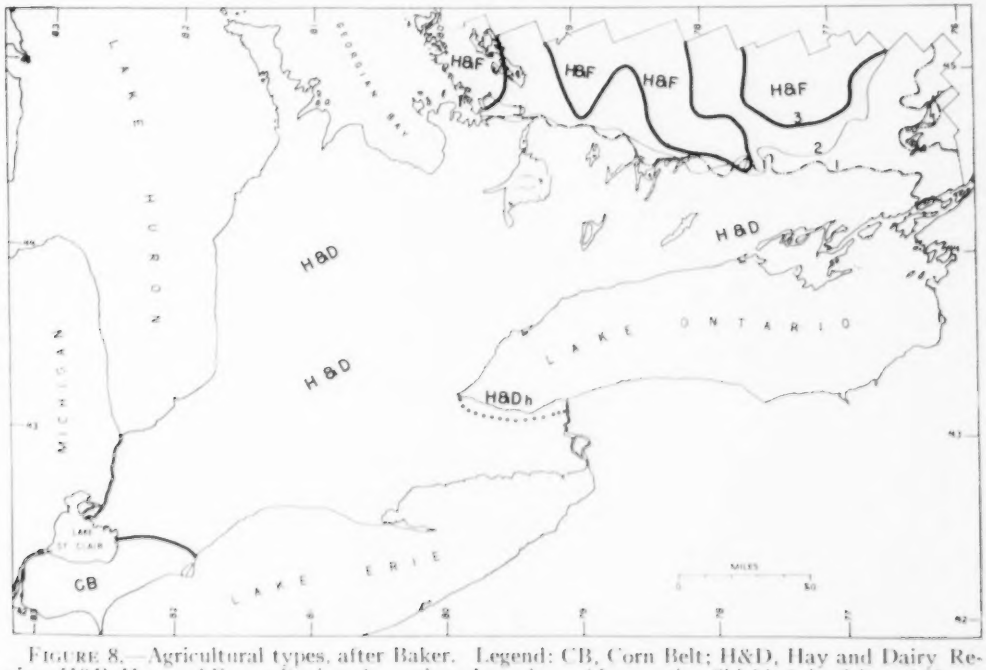

FIGURE 8.—Agricultural types, after Baker. Legend: CB, Corn Belt; H&D, Hay and Dairy Region; H&F, Hay and Forest Region; 1, southern boundary of Laurentian Shield; 2, isarithm of 50 per cent of all land in farms; 3, isarithm of 10 per cent of all land in crops and pasture.

a goodly portion of the Shield must be included.

Two other distinctions: Baker recognizes specialized horticulture as a local variant within the Hay and Dairy Belt, thus justifying the recognition of the Niagara Fruit District on this map (Figure 8). And, according to his own criteria, we must separate out the Ontario Corn Belt, which consists of Essex and much of Kent County, an area of about 1,200 square miles and large enough to be represented on most maps of North America. The Corn Belt is a vital factor in Canadian domestic and foreign trade, and unique in being the warmest part of all of Canada's farm land. It should be recognized in all agricultural-region maps of North America.

Another classification of agricultural types is that prepared by Richard Hartshorne and Samuel Dicken for North America and Europe. (*Annals Assn. Amer. Geog.* 25, 1935, 99–120.) These writers do not recognize dairy farming as a primary division. Four of their primary types are, however, found in Peninsular Ontario: The *corn-wheat-livestock* and *small grains-livestock* include what is commonly termed the Ontario Corn Belt (Figure 9). Their *commercial orchards and truck farms* type includes the Niagara Fruit District, too restricted to be shown on their accompanying map. The fourth division, *hay-pasture-livestock*, includes most of the Peninsula and extends well into the Shield.

In 1934, Hartshorne and Dicken delimited these same agricultural types for the world as a whole. (*Syllabus for the Introductory Course in Economic Geography*, 2nd Edition, 1934). In their description, however, they specifically recognize two subdivisions of the *hay-pasture-livestock* type: one in which meat production is the principal end of farming, the other where dairy products predominate. By using the isarithm of

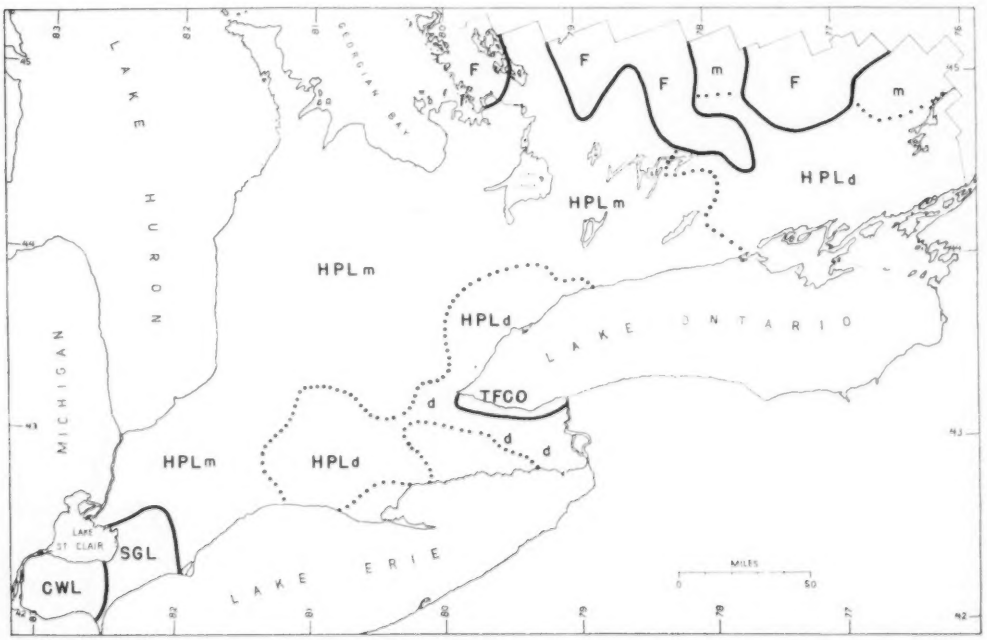

FIGURE 9.—Agricultural types, after Hartshorne and Dicken. Legend: CWL, Corn-Wheat-Livestock; SGL, Small Grains-Livestock; HPLm, Hay-Pasture-Livestock, meat specialty; HPLd, Hay-Pasture-Livestock, dairy specialty; F, Forest and Unused.

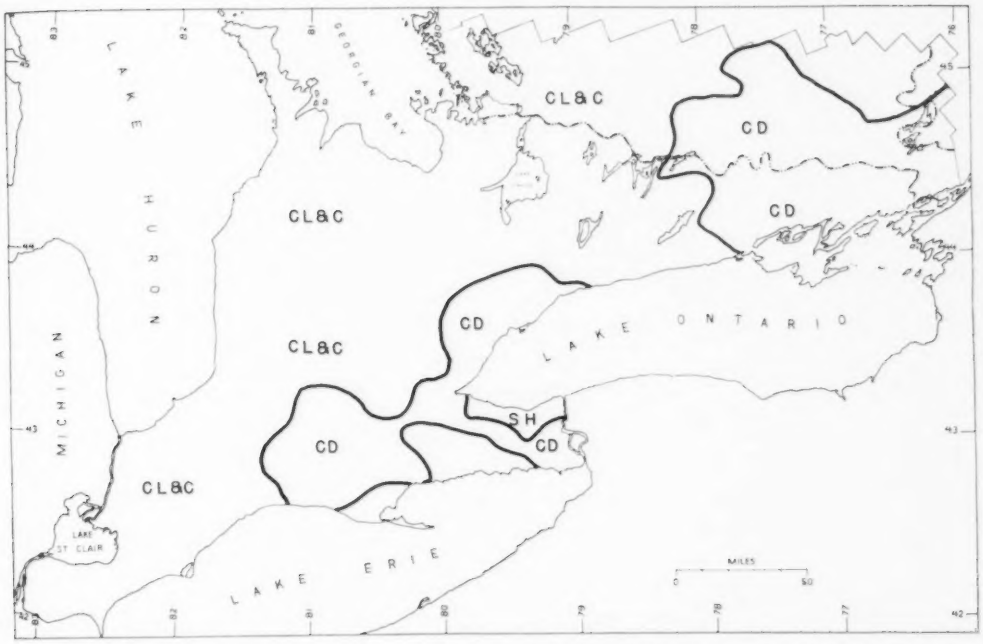

FIGURE 10.—Agricultural types, after Whittlesey. Legend: CL&C, Commercial Livestock and Crop Farming; CD, Commercial Dairy Farming; SH, Specialized Horticulture.

one-third of the livestock in dairy cows, these two subtypes are separated in Figure 9. This modified classification fits the Peninsula remarkably well, for the part of the hay-pasture-livestock area not dominated by dairying is devoted mainly to the raising of beef cattle, sheep, swine, and poultry.

In contrast to this classification, Whittlesey's "Major Agricultural Regions of the Earth," (*Annals Assn. Amer. Geog.* 26, 1936, 199–240 and maps) recognized commercial dairy farming as a primary type. He set this type off from neighboring types by a high ratio of hay to grain, and by a relatively high percentage of dairy cows in the livestock total. He also insisted on the validity of field as well as census data, and expressly disclaimed any attempt to recognize varying degrees of intensity of land use.

If "the common parlance of the country side" be trustworthy, as Whittlesey insists it is, the Corn Belt and Niagara Fruit District must be set off from the dairy region, as indeed both traverses and statistics indicate that they should be (Figure 10). He selects the isarithm along which one-third of the total livestock are dairy cows as a suitable one for separating *commercial dairy farming* from *commercial livestock and crop farming*. This line is used in Figure 10 to limit the "Commercial Dairy" area. It is clear that on this basis not more than half of the Peninsula should be classed as *commercial dairy farming*, most of the remainder belonging in *commercial livestock and crop farming*. Indeed, his description of these two types admirably fits the two regions as delimited on this map. In other words, the types recognized by Whittlesey fit the facts as regards dairying, but his map requires major corrections. No northern limit is drawn in Figure 10, because every township has some farming, and therefore cannot be placed in the "land totally unused for agricul-

ture," the division which Whittlesey shows as occupying the area north of the Peninsula.

CONCLUSION

In terms of field and statistical data, the presence of commercial dairying throughout the Peninsula, the restriction of dairy farming as a dominant phase of rural economy to half or less of the Peninsula, and the continuance of dairy farming northward into the Shield and eastward to the St. Lawrence Lowland are apparent. In addition, the presence of other clearly defined agricultural types is revealed. These areal distinctions should be recognized in regional delimitation of agricultural types, whether national, continental, or world-wide in scope.

This analysis builds upon earlier studies and attempts to refine their conclusions. In so doing, it becomes clear that each of the continental and world-wide classifications examined recognizes most but not all of the basic agricultural contrasts found in Peninsular Ontario, and that the maps which delimit the types in each classification require significant revision so far as this area is concerned.

The distributions presented here constitute little more than a snapshot. Comparisons with data for earlier times are required in order to discover whether or not these core areas of dairy farming are the centers of origin, how they came about, whether they have expanded or contracted in recent decades, and whether they are now vigorous or decadent.

CACAO IN COSTA RICA

Elizabeth F. Keithan

COSTA RICA was of little importance as a cacao producing country until the United Fruit Company became interested in the industry in 1914. Desirous of replacing financial losses sustained by the decline of the banana industry in this country, the company replanted parts of the abandoned banana lands to cacao. This was an impetus to the industry and a rapid extension took place.

Costa Rica has become the sixth most important cacao producing country of Latin America and the thirteenth of the world. It produced 8,074 tons in 1937. This comparatively new region produces the ordinary cacao of high quality, second only to that produced by Bahia, the premier producer of ordinary cacao of the world.

The cacao industry of Costa Rica is of secondary importance to the country. Here on the Caribbean lowlands cultivation of bananas is the primary industry. Both industries are dominated largely by foreign capital. The coffee industry which is carried on chiefly on the highlands is the mainstay of Costa Ricans. The banana and cacao industries have less to do with the real lives of the natives except to contribute the returns usually received from industries that are exploited by foreign capital (Figure 1).

Practically all the cacao of Costa Rica is produced in the low-lying district of the Caribbean coastal plain, although there is a small amount produced on the Pacific slopes in the hinterland of Punta Arenas. Because of insufficient rainfall in this latter area, the crop here is raised under irrigation. A few thousand pounds are exported every year, but due to the competition of the district on the Caribbean coast and other producing regions outside the country, production of this district figures little in the export trade.

On the Caribbean lowland cacao is planted on available valley land or nearby hillsides in selected spots west from Limon along the Northern Railway to the Reventazon river and also on what is called the "Old Line" that branches off from the main railway at La Junta. In addition to these spots there are areas devoted to cacao southeast from Limon located two or three miles inland from the coast, extending to the Panama border, particularly along the Banano and Estrella rivers (Figures 2 and 3).

Published statistics of cacao acreage are admittedly deficient. Those given in the government's annual publication for 1928 are 63,113 acres, having over 22,000,000 trees. There was little or no extension the next two years. In 1931 and since, low prices have made the industry unprofitable in many cases leading to the abandonment of acreage and destruction of trees to make room for other crops.

The lowlands of Central America bordering the Caribbean Sea have a rainy low-latitude type of climate. They have high uniform temperatures, high relative humidity at all times and heavy rainfall well distributed throughout most of the year.

The highest temperature at sea level reaches 95 degrees F. and for moderate elevation inland 90 degrees F. Extreme minimum temperatures range from 60

degrees F. at sea level to a few degrees lower on lands slightly higher. The average annual temperatures from sea level to an elevation of 1,850 feet range from 79 degrees F. to 73.5 degrees F. Limon which is located near the heart of the cacao district has an average annual temperature of 80 degrees F. Since an average annual temperature of 80 degrees F. is desirable for cacao production, this climatic condition helps to explain the presence of the industry in this locality (Figure 4).

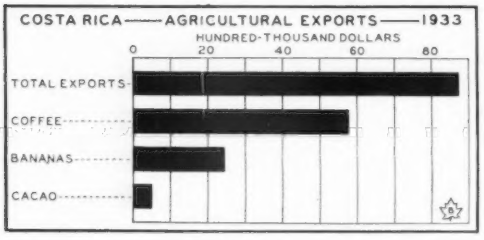

FIGURE 1.—Coffee is the main agricultural crop of the native Costa Ricans in the high lands; bananas and cacao contribute to the native and imported labor of the Caribbean lowlands. (Source: Foreign Commerce Yearbook, 1933. U. S. Bureau of Foreign and Domestic Commerce.)

As was cited, rainfall for this region is heavy and well distributed throughout most of the year. That of Limon is 122 inches over a period of years. At Siquirres, a station at an elevation of 197 feet in the heart of the cacao district, the rainfall for the year is 122.57 inches (Figure 5). San Carlos some distance inland at an elevation of 525 feet had 144.61 inches of rainfall over a period of six years. Since the best results are obtained in areas with from 75 to 90 inches, the areas in Costa Rica are placed at a disadvantage for in a single year rainfall often exceeds 150 inches, the average being 120 inches (Figure 6).

In a region where rainfall is too heavy for ideal conditions for production of cacao, it is reasonable to believe that the plant would suffer from too high relative humidity. There is no actual climatological data on this phase of climate but the plants often are subjected to black rot, a disease of the cacao pods during the rainiest season and highest humidity. One-sixth to one-seventh of the yearly yield is lost because of this disease.

This region is in the path of the trade winds which often work havoc in the banana plantations. The cacao farms, however, are situated in protected sites where the influence of the trades is scarcely felt. Fortunately hurricanes are unknown and the region does not suffer damages from them as is often the case in the Dominican Republic, or, more rarely, in eastern or southern Trinidad. The sites resemble those of Bahia in this respect. Here, as there, the plantations are exposed to the gentle breezes of the trades but not to the violence of hurricanes.

The selection of land for cacao in Costa Rica needs very little attention. Most soils of the Caribbean lowlands are suitable with the exception of the very heavy clays, the sandy or gravelly soils, and swamps. The best soils for cacao are the rich alluvial deposits especially those containing a sufficient amount of clay to give the soil a heavier body than the average light loams. As has been the custom in regions where cacao is usually planted, more attention has been paid to the physical aspect of soils than to its chemical composition. The history of banana cultivation has been a guide. If the banana plant has held up well for at least four years the land is usually good for cacao, unless there are some obvious reasons why cacao should not be planted.

Here, as in other cacao regions, the tap root of the tree attains a length of from 3 to 6 feet and should never touch compact gravel, stone, or stagnant water. Most of the areas have soils

that respond to these requisites for the majority of them are deep and have a not too high underground water level. The presence of a number of good-sized rivers, the direction of their flow, and the selection of the cacao sites near the many rivers usually insure good drainage. The cacao farms are generally located near the many rivers which traverse this district, and with their fertile alluvial soil and good drainage are conducive to the production of the crop (Figure 2).

Besides having the usual requisites for good cacao soils, Costa Rica has soils that do not "wash" like soils on lands of a similar relief in humid parts of the United States; they are as resistant to erosion as the deep sandy soils of the Florida Peninsula even where the texture exceeds in fineness the stiffest North American clay. In Costa Rica and many other parts of Central and South America, the extremely fine textured soils possess perfect physical conditions for absorption and retention of moisture, for prevention of erosion and easy working qualities. This rather heavy clay has the property of sticking to itself, developing apparently a flocculated state such as to maintain a most desirable mellowness. Through these mellow soils rain-water percolates freely, the excess flowing off without taking up and carrying away the fine particles which refuse to mix with water except by extreme agitation and rubbing.

These are the rich soils in most cases producing without fertilization of any kind good crops of corn, bananas, beans, coffee, and cacao. Bananas in these soils have given good yields continuously for long periods and have shown little or no decline when unaffected by the Panama disease.

Chemical analysis frequently shows the soils of the region to contain a higher percentage of the usual constituents of

FIGURE 2.—Cacao and physical map of Costa Rica. Cacao plantations are distributed mainly along the rivers and in the interstream areas from La Junta to the southern border on the former "banana lands" of the Caribbean lowlands. The hinterland of Punta Arenas supports a few plantations on the west coast. (Source: J. Paul Goode's School Atlas, and the United Fruit Company.)

the productive lands than do soils of the United States, particularly as regards content of organic matter, nitrogen, and phosphorus. In places there is an apparent deficiency of potash and lime, but this is not the usual condition, especially in the surface soil. Some well-drained types of land show a higher content of organic matter in the subsoil than in the soil, a condition never encountered in temperate zones except in the peculiar podsol types of the cooler northern latitudes.

It is probable that these fine textured fertile soils do not only exist in the banana and cacao lands of Central America but also in selected cacao areas of the other major producing regions of Latin America. There are instances cited in every one of the regions where cacao has been grown without fertilization for a century or more. Part of this longevity could easily be attributed to such favorable soil conditions.

FIGURE 3.—The railroads of Costa Rica were first built to serve the banana industry and now are devoted in part to carrying cacao to the main line which conveys it to Limon for export. (Source: Long, Rodney W., "Railways of Central America and the West Indies," Trade Promotion Series, No. 5, Washington, D. C. An adaptation.)

DEVELOPMENT OF THE CACAO INDUSTRY

Prior to 1820 the highland people of Costa Rica had almost no means of communication with the outside world. They produced little which they could export and were separated from either coast by several days of difficult and dangerous traveling. Commerce with the outside world, however, began soon after the declaration of independence with the development of the coffee industry, which was exported for the first time in 1835. The importance of this crop increased rapidly, especially after the construction of a cart road to the Pacific port of Punta Arenas, completed in 1846.

The exporters at first encountered great difficulty and expense in shipping this product either around Cape Horn or by the expensive route of the Panama Railway. The government, therefore, early endeavored to provide more adequate means of transportation. In 1871 work on a railway line from Limon on the Caribbean Sea to the capital was begun by Minor C. Keith. After great difficulties train service to San Jose, the capital, was finally opened in 1890, and the republic found itself for the first time in direct communication with the United States and Europe.

Cacao had been produced in small quantities in the section of Costa Rica adjacent to Limon for about two centuries. When the construction of this railway was undertaken the industry received an impetus and plantings were increased (Figure 3). The production then expanded and the first record of export was in 1895 when 1,984 tons were exported.

Earnings on the carriage of cacao were insufficient to meet the operating costs of the partially completed railway line, and planting of bananas was undertaken to provide additional freight and revenue until such time as the road might be opened to through traffic.

Profits on the bananas soon proved to be attractive and banana planting then became, and has since remained, the principal industry of the Limon District, relegating cacao to a distinct second crop.

Production of bananas reached its peak in 1913, when 11,170,812 stems were exported. In 1935 exports from the same districts amounted only to 2,908,836 stems. As the decline continued, more attention was given to cacao. Bananas exhaust land on the average of eight years. While they may no longer be produced thereon, all the properties in the soil necessary to cacao remain. Rather than permit the land to remain idle, cacao has been put in or put back, albeit returns from the latter normally are but one-third those from the former.

With the decline of banana production and the consequent release of laborers from 1926 on, many have

turned to cacao production (Figure 7). These laborers are West Indian negroes for the most part, secured by the United Fruit Company for work in the banana plantations. They live in separated houses scattered in the plantations or in villages located near the tram lines which were built first to serve the banana industry and are now devoted in part to carrying the cacao to the main railroad which conveys it with other products to Limon for export.

In 1930 Costa Rica exported 8,064 tons of cacao, which up to that time was its year of maximum production. The average selling price was 5-4/5 cents per dry pound. At such a price there was little margin of profit as a whole, and in the cases of the larger planters, with heavier overhead and plant charges, it has meant losses, and thus it may readily be understood why large planters have been glad to rent plots to laborers who, while obtaining a meager livelihood, also have prevented the trees from becoming ruined.

The raising of cacao as a commercial crop in Costa Rica is a relatively young enterprise. If the banana industry continues to decline, which is likely, more areas will be released for cacao planting. There are also lands of secondary forest suitable for cacao. Hence the youthfulness of the industry and the available new areas along with governmental encouragement and plenty of foreign capital may encourage extension of the crop. On the other hand the production is not likely to increase so long as low prices prevail, and the cost of labor is so high on the larger plantation.

PREPARATION FOR MARKET

The methods of fermenting cacao in this region probably represent the most improved methods in Latin America. The old process of piling the beans in heaps and covering them with leaves or earth, or in baskets or barrels lined with banana leaves has given place to the use of scientifically constructed fermenting bins. Instead of the old method of bagging the wet cacao for shipping to the drying plant, tank cars of about 27,000 to 45,000 pounds capacity, with openings on the top and on the sides, are now used to carry the beans in bulk. These cars are loaded from elevated platforms along the railway line to which the beans are brought from the farm by mule back or narrow gauge tram cars. Some platforms are provided with hoppers. The hoppers are filled as the beans arrive from the farms and are then fed to the cars by gravity, thus making possible the loading of a large quantity of cacao in a very short time.

In order to insure an even distribution of heat during fermentation, the cacao beans are turned every forty-eight

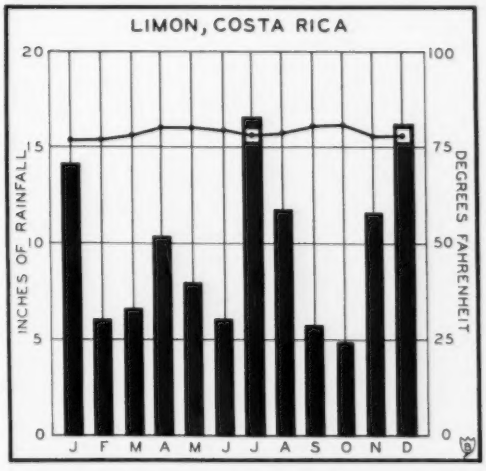

FIGURE 4.—Temperature and precipitation of Limon. The high even temperatures and the often too heavy and well distributed rainfall of Limon throughout the year help to explain the cacao production of this region. (Source: for rainfall, W. W. Reed, "Climatological Data for Central America," *Monthly Weather Review*, April, 1926; for temperature, Colby and Foster, Economic Geography for Secondary Schools, 1931.)

hours. To facilitate this operation, the fermenting bins are built in tiers, so that after the first forty-eight hours, the top bin is opened on the side and dropped directly into the next one, and so on to a third one which empties directly into a mechanical conveyor which carries the cacao into the drying drums. After fermentation is complete the wet beans are transferred by mechanical conveyors into drums having a capacity of from fourteen to fifteen thousand pounds each; these drums revolve slowly and are supplied with a continuous flow of hot air, between 130 and 165 degrees F., kept in motion by a strong ventilator. The drying period varies from thirty to sixty hours. As these drums revolve the beans rub against each other, acquiring in this way a high polish and finish. In spite of a fermentation which seems insufficient and a drying process which is performed at temperatures which are generally held to be higher than is favorable to cacao, the Costa Rican cacao brings a rather good market price.

A small share of the labor in Costa Rica is performed by task but the contract system predominates. The wages paid are the same as those paid to laborers on the banana plantations but less than those paid on the coffee plantations, which are about 50 cents per day. This is partly explained by the direct competition of labor in the banana and cacao plantations. Cacao, as we have cited, is grown in this region on abandoned banana lands and the labor supply for both industries is obtained from the same sources.

The wage of a laborer on a cacao plantation is low when compared to those of similar workmen in the orchards of the United States. Since his standards of living are not so high and often his food and shelter are provided by the planter, he does not fare so badly as would appear at first glance. Most of the labor is needed on the plantation for the first five or six years until the trees

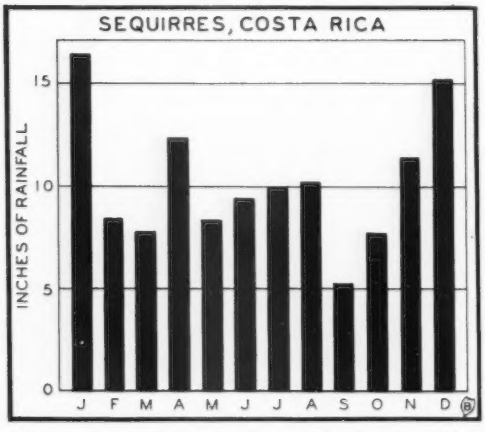

FIGURE 5.—Precipitation of Siquirres. This station located at an elevation of 197 feet in the heart of the cacao district, with 122.57 inches of rainfall a year, receives more than the needed amount of moisture for the crop. (Source: W. W. Reed, "Climatological Data for Central America," *Monthly Weather Review*, April, 1926.)

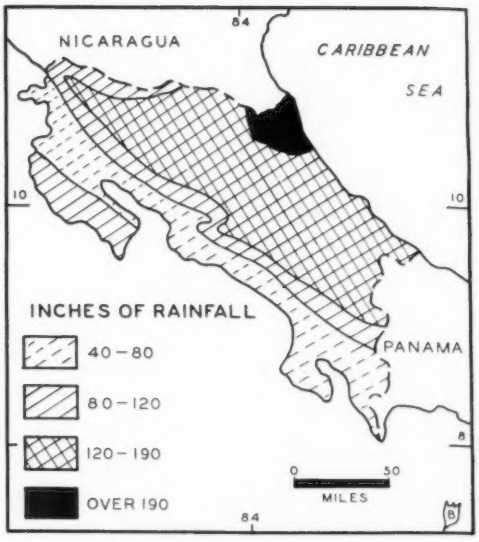

FIGURE 6.—Rainfall of Costa Rica. The best results for growing cacao are obtained when the average rainfall is from 75 to 90 inches. This map shows that areas are placed at a disadvantage, for the average indicated is 120 inches a year. (Source: Klimakunda von Mittelamerika, Handbuch der Klimatologie, Band II, Teil H, 1932, Köppen and Geiger. An adaptation.)

come into bearing and at each harvesting season. Little is seemingly needed at other times, though more care of trees in their normal development as well as supervision of disease which so often besets them would improve and increase production.

Most of the cacao grown in Costa Rica is on the small-scale farm rented to tenants by the United Fruit Company. These tenant farmers and smaller planters turn over their productions to several firms engaged as merchants and exporters in the several cacao centers. In the past this trading was done by merchants only and payment was made in the form of merchandise and provisions. Within the past few years, the United Fruit Company, which is the principal producer, began offering cash prices and it gradually obtained the lien on small planter production.

This company has a large drying plant and the more cacao it handled the wider was distribution of overhead and the greater its profits when profits were being made. Since prices have fallen, however, such outside purchases have been stopped and the planter disposes of his crop under the best trading conditions prevalent in his particular district.

Cacao growing was looked upon by the United Fruit Company as the golden opportunity to augment the resources of this district when the banana production began to decline. At one time it appeared to fulfill this promise. During the last few years, however, prices paid in the world markets have shown so little margin of profit, that a great portion of the cacao bearing is being allowed to revert to jungle and the future of the district is not promising.

The consumption of cacao in the United States has trebled since 1914. Owing to this country's close connection with Costa Rica and the United Fruit Company most of the cacao finds a market in New York and other distributing centers of the east coast. Practically all the cacao is shipped by the Caribbean through Limon which has a good harbor improved by the United Fruit Company since the exportation of bananas in large quantities from this port began. Steamers dock directly at the deep water pier and good facilities for loading and unloading cargoes obtain.

FIGURE 7.—A cacao tree grown in the plantations of the United Fruit Company near Limon, Costa Rica. Note the position and number of ripe fruit on the trunk and the main branches. (Courtesy of United Fruit Company.)

The capacity of the world to absorb larger supplies of cacao can hardly be doubted. Up to quite recently production and consumption were on a par and the industry as a whole was in a very satisfactory condition. Much of the present unsteady state of affairs is from world depression rather than from any immediate cause in the industry itself. It is reasonable to believe that in the restoration of normal times cacao from Costa Rica will possess an enlarged market and experience a return to prosperity to its region of production.

THE BOUNDARIES OF UTAH

George F. Brightman

A CASUAL glance at a map of Utah will disclose that its boundaries, all of them straight lines, are not directly related to such natural features as rivers and mountains. In spite of their artificial appearance, however, the boundaries of Utah are definitely not without geographic significance, and their present position, although to a certain degree fortuitous, reflects a number of facts of economic geography.

The importance of economic geography in the evolution of Utah's boundaries has been largely a result of the unique character of the peoplement of the area. As is well known, the area which was to become Utah was first settled by members of a single religious group, the Mormons. The history of their successive migrations from New York to Missouri, to Illinois, and finally, in 1847, to Great Salt Lake, is common knowledge. (A very full account is given in H. H. Bancroft: *History of Utah, 1850–1886*, San Francisco, 1889.) The Mormons hoped to find in the Great Basin an area which could be made predominantly Mormon, an area where they no longer would be a persecuted minority group. They wished to remain in the United States, however, and they could not hope to maintain by force their control of the area in which they settled. The isolation for which they may have hoped was banished by the stream of gold-seekers bound for California, which began to pass through the Mormon settlements less than two years after their foundation. The Mormon settlers' only hope of maintaining identity was by means of economic control of the area, and consequently the economic geography became of critical importance in the struggle to achieve a Mormon state.

The Core Area

The area which the Mormons hoped eventually to occupy was delimited by the boundaries proposed for the "State of Deseret," organized in 1849, two years after the first settlement, but never recognized by the United States. (See Figure 1.) The area thus staked out as a field for Mormon colonization extended from the crest of the Rockies to the crest of the Sierra Nevada, and from the then border of Mexico to the Oregon country; it included as well a corridor to the sea in southern California. The area offered one great advantage for settlement; save for the portion in southern California, it was populated only by a few scattered Indians.

Geographic conditions were, however, far from uniformly favorable for settlement. The new "state" lay almost entirely in the Great Basin and the Colorado Plateaus. Precipitation was far too low to permit the agricultural practices of the humid Mississippi Valley. Farming could be carried on only by irrigation, and the water supply was large enough, and constant enough, in only a few localities. Chief among these favored areas was what has come to be known as the Salt Lake Oasis. This is a strip of land some 130 miles long and from 2 to 18 miles wide, lying at the foot of the Wasatch Mountains, comprising Utah and Salt Lake valleys. Here the many small streams emerging from the mountains make possible in-

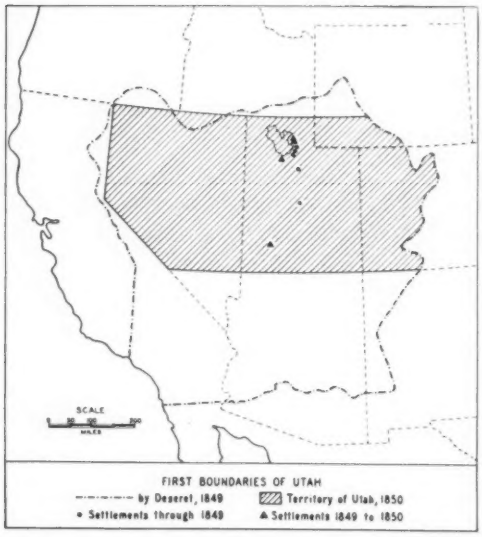

FIGURE 1.—The earliest boundaries of Utah, showing the area claimed by the "state" of Deseret, and that allotted in 1850 to the Territory of Utah. The wide distribution of the early settlements is notable.

tensive irrigation agriculture over a rather large area (Figure 2). (See Langdon White: "Agricultural Geography of the Salt Lake Oasis," *Denison Univ. Bull.*, Vol. 21, pp. 133–136, 1925, and another paper by the same author, "Distribution of Population in the Salt Lake Oasis," *Journal of Geog.*, Vol. 27, pp. 1–14, 1928.)

It was fortunate that the Salt Lake Oasis, the only part of the Great Basin capable of supporting a large agricultural population, was the site of the first Mormon settlement in 1847, for it was able to support the remarkable influx of population which followed. By 1850, when the movement west from Illinois was virtually completed, there were no less than 11,354 persons in the valley, some 6,000 of them in Great Salt Lake City. The new settlements were widely scattered in the oasis. (See Figure 2.) They were chiefly of a type unusual in the United States, true rural villages, consisting of clusters of farm houses and farm buildings, from which the farmers went daily to work their fields. Irrigation works were constructed and operated in coöperation, and settlement was in general directed by the church officials, who selected parties of settlers to occupy various sites.

The consequences of the rapid mass settlement of the oasis have been very great. The area was established in three years both as one of the most densely populated parts of the West, and as permanently Mormon in character. It formed then, and forms today, the *core area* of the Mormon state, having at present something more than three-fifths of the population of Utah. By far the most densely populated area in the Great Basin, it naturally dominated Utah, even when Utah Territory included most of what is now Nevada, and half of present day Colorado. The situation is in striking contrast with that of most western states, where areas suitable for settlement were smaller and more scattered, and the dominance of any single core area was uncertain.

The population of the oasis continued to grow, even after the movement from Illinois ended. Missions both in America and abroad were highly successful; converts flocked to Utah, and by 1860, there were 40,295 persons living in the territory, most of them in the oasis. In fact, as early as 1857, virtually all the irrigable land in the Salt Lake Oasis was taken up. White notes that the occupied area in that year coincides remarkably well with that of 1925. (Langdon White: "Distribution of Population in the Salt Lake Oasis," *Journal of Geog.*, Vol. 27, p. 7, 1928.)

CHANGING BOUNDARIES OF UTAH

The Salt Lake Oasis core area formed a minimum area for the Mormon state, and the boundaries, never official, of Deseret, a maximum hoped for by the

Mormons. The actual boundaries of Utah have been located at various positions between these two extremes. Some of the changes have been due to legislative whim or historical accident, but the most important changes have reflected certain facts of economic geography.

When Congress, toward the close of 1850, finally organized the Territory of Utah, it was given an area considerably less than that which Deseret had claimed. For non-geographical reasons which do not concern us here, the area acquired from Mexico was divided into two territories, Utah and New Mexico, and California was admitted as a state, with its present boundaries. (See Figure 1.)

The large area arbitrarily attached to the Salt Lake Oasis core to form the new Utah Territory, was practically unpopulated. If it was to remain part of the Mormon state, it must perforce be settled by Mormons before others found their way into the area; their experience in Illinois had shown the Mormons that the "gentiles," as they called all non-Mormons, were inclined to resent Mormon rule, even in a community predominantly Mormon. If the gentiles were permitted to settle in force anywhere in the territory, they would probably succeed in detaching parts of it from the core area.

Not many parts of the territory were suitable for settlement, outside of the core area, and those areas which were suitable for irrigation agriculture were occupied almost immediately by the Mormons. (See Figure 3.) Most important were the villages established in the valleys of the Sevier, San Pitch, and Rio Virgin, forming a linear group of settlements extending southwest parallel to the Colorado Plateau Front. Here conditions were less favorable than in the Salt Lake Oasis, principally because of the smaller water supply; the present agricultural occupance reflects this fact in its emphasis on alfalfa and livestock, both cattle and sheep.

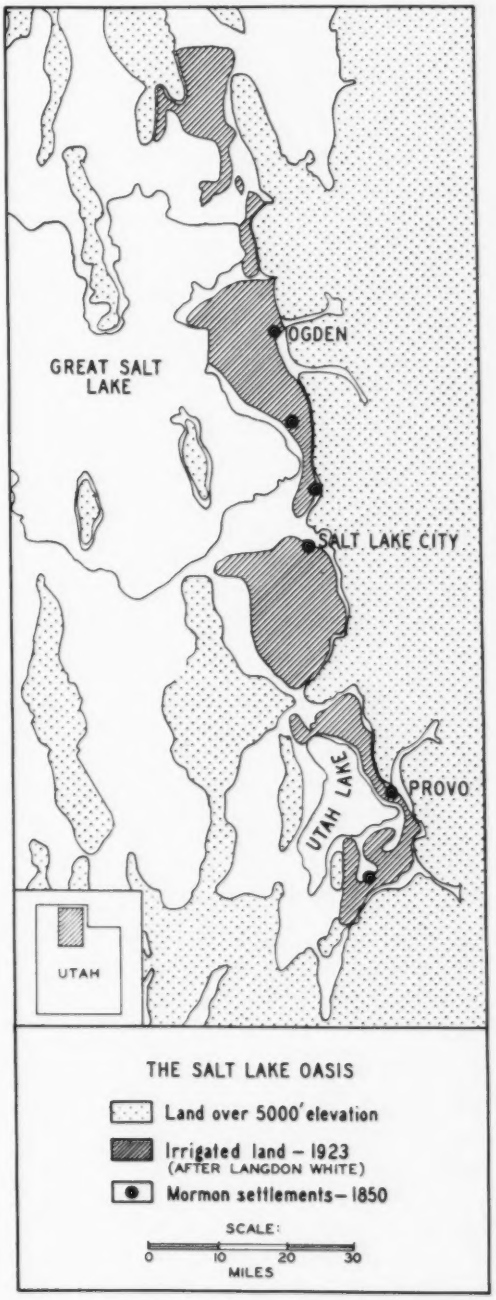

FIGURE 2.—The Salt Lake Oasis, showing the extent to which the earliest Mormon settlements were spread throughout the irrigable area.

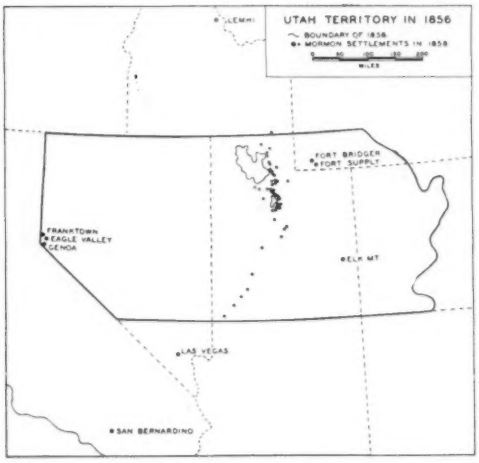

FIGURE 3.—The boundaries of Utah, and the location of Mormon settlements at the close of 1856. The expansion of settlement towards the periphery of the territory is noteworthy.

Another favorable area for agriculture was along the eastern foot of the Sierra Nevada, in the vicinity of present-day Carson City, Nevada. Here a Mormon trading post was established in 1851, and by 1857 there were nearly a thousand Mormons farming in the area. (E. M. Mack: *Nevada, A History of the State*, p. 170, 1936.)

There was even one important settlement outside Utah Territory, namely San Bernardino, in California. Started in 1851, by the purchase of a large ranch, it was a thriving town of some 1400 Mormons in 1855, and seat of the Mormon county of San Bernardino. (Jules Remy and Julius Brenchley: *A Journey to Great-Salt-Lake City*, vol. ii, p. 456, London, 1861.)

The settlement of the areas named, very nearly exhausted the possibilities; the settlements shown at Lemhi, Forts Bridger and Supply, Elk Mountain, and Las Vegas, were little more than forts and mission stations. Mormon irrigation agriculture could scarcely get a foothold where water was practically entirely lacking, or where great dams and other works were necessary for irrigation.

Settlement of the areas suitable for agriculture within the territory was not sufficient to prevent gentile infiltration, however, for one important resource was left unexploited by the Mormons. This resource was the mineral wealth; Mormons were forbidden by their church to mine the precious metals.

Moreover, unfortunately for the Mormons, important mineral deposits were situated on the periphery of their territory. The rich gold and silver bearing veins of the Comstock Lode outcropped in what is now western Nevada, about 15 miles northeast of Carson City. Even before this deposit was discovered in 1859, there had been a few placer miners in the area, living, not without friction, among the Mormon farmers. With the discovery of the Comstock Lode and the rapid growth of Virginia City and Silver City, great numbers of "gentiles" flocked to the mines. By 1860 there were 4,000 non-Mormons in the area. (G. F. Becker: *Geology of the Comstock Lode*, U. S. Geol. Surv., Monograph 3, p. 4, 1882.) Meanwhile, the Mormon settlers had temporarily withdrawn, from this as well as from the other distant settlements, in 1857. This was in connection with the so-called Utah War, a threatened conflict between Federal troops and Mormon militia, which never actually took place. The incident caused the abandonment of many of the more distant Mormon settlements, however, for the settlers were recalled to Salt Lake City by the church leaders (cf. Figures 3 and 4). An attempt made by Utah in 1859 to re-extend authority over the Carson City area was obviously futile, and Congress, in response to numerous petitions of the miners, created the Territory of Nevada in 1861. The new western boundary of Utah was set at the 39th meridian west of Washington (116° 03′ W. of Greenwich). This formed a most satis-

factory boundary between the two core areas, the Salt Lake Oasis and the Comstock Lode area, for it was situated in the center of a considerable extent of unpopulated country. (See Figure 4.)

The mining activity which lost to Utah, also in 1861, a large area on the east, was less clearly localized in one camp. The discovery of placer gold in the vicinity of Denver in 1858, led in 1859 to the famous Pike's Peak gold rush, which brought some 40,000 miners into an area previously practically unpopulated. (H. H. Bancroft: *History of Nevada, Colorado, and Wyoming*, pp. 375–6, San Francisco, 1890.) The census of 1860 listed 34,277 settlers in the area. The original discoveries had been outside the Territory of Utah, lying east of the continental divide in what was then Kansas, but shortly after the first rush, camps were located within the mountains, many of them across the divide, and hence within the jurisdiction of Utah. This fact was uniformly and realistically disregarded, and when in 1861 Congress created the Territory of Colorado, the eastern boundary of Utah was moved to the 32nd meridian west of Washington (109° 03′ W. of Greenwich). (See Figure 4.) The new line lay in the middle of a well-defined population divide. It was far more satisfactory under the new conditions than the more natural appearing crest of the Rockies, and it remained more satisfactory for some time. In Hartshorne's terminology, the original line was an *antecedent, naturally-marked* boundary; the new line was *consequent* upon the *natural divide* furnished by the practically unpopulated Colorado Plateaus. See Richard Hartshorne: "Suggestions on the Terminology of Political Boundaries," (Abstract), *Annals Assoc. of Amer. Geog.*, Vol. 26, pp. 56–7, 1936.

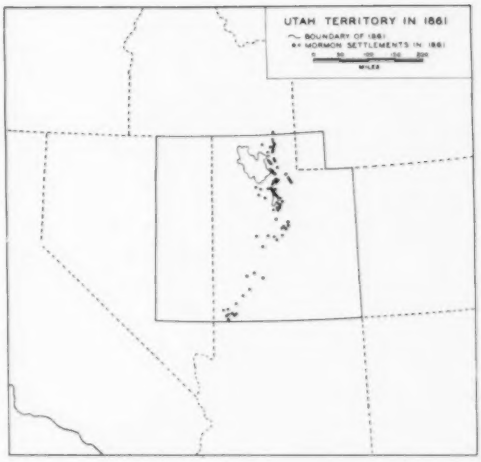

FIGURE 4.—The boundaries of Utah, and the Mormon settlements at the close of 1861, showing the losses of territory to Nevada and Colorado, and the abandonment of certain distant settlements.

The new boundary between Utah and Nevada was less stable, and soon suffered further modification. Mining settlement spread eastward among the basin ranges, from the Virginia City core area, and the population divide likewise shifted eastward. It would be idle to assert that the eastward movement of the political boundary was entirely the result of these population movements, which in turn were reflections of the economic geography; nevertheless the eastern extension of the mining settlements furnished at least the excuse for the annexation to Nevada of two strips of Utah, each a degree of longitude wide, in 1862 and 1866. (See Figure 5.) In the later year, when the Utah-Nevada boundary was located in its present position, 37 degrees west of Washington, Nevada was also given a considerable portion of northwestern Arizona, which had been the site of active Mormon agricultural settlement. In 1865 the Utah legislature had unsuccessfully petitioned the federal government to add this small area to Utah, with considerable justice, for the settlements were contiguous to the settled part

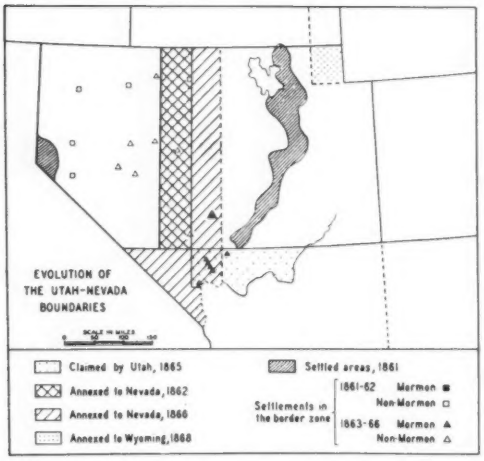

FIGURE 5.—Evolution of the Utah-Nevada boundary, showing the disputed border zones arising out of the spread of settlement from the two core areas.

of Utah, and widely separated from the territorial capital of Arizona. (House Misc. Doc. 53, 38th Congress, 2nd Session.) The Mormon settlers in this area annexed to Nevada were in continuous conflict with the state authorities until 1871, when nearly all removed into southern Utah. (See Figure 5.)

The total number of people involved was, however, relatively small (some 658 Mormons in the portion of Arizona gained by Nevada, and some 600 more in the strip annexed from Utah), and on the whole the new boundary was not unsatisfactory. The line ran through an essentially unpopulated area, and made a fairly satisfactory division between the predominantly agricultural areas to the east, and the mining region to the west.

The final stabilization of the Utah-Nevada boundary was the last important boundary change Utah was to suffer, for the two losses in the northeast corner of the Territory, of a small area to the then Territory of Nebraska in 1861, and of some 4,000 square miles to Wyoming in 1868, were of little consequence. On the map a corner seems to have been removed arbitrarily from Utah, but in reality the line follows approximately the sparsely populated Wasatch and Uinta Mountains.

STRENGTHENING OF THE CORE AREA BY MINING ACTIVITIES

It has been seen how serious to Utah were the consequences of the peripheral location of the mining areas in what are now Colorado and Nevada. The distribution of the important mineral deposits within present-day Utah is very different, as was discovered soon after the start of important mining development, in 1869. Of the 15 camps having more than 50 claims registered prior to 1917, 10 are grouped immediately on the boundaries of the Salt Lake Oasis, lying in the Wasatch and Oquirrah

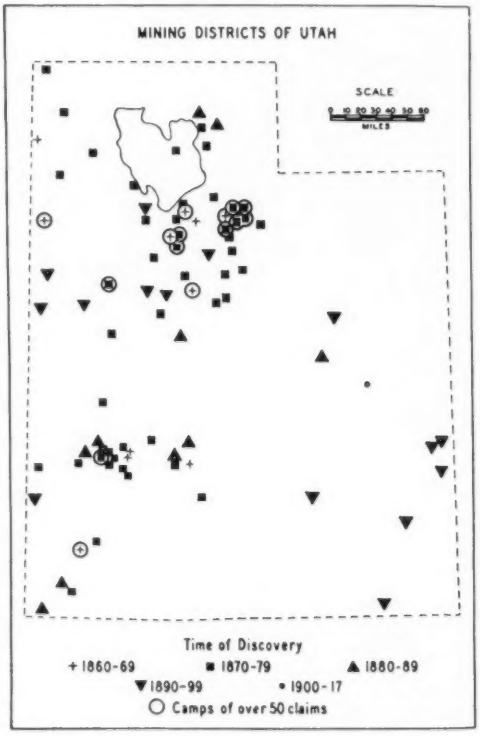

FIGURE 6.—Mining districts of Utah. The predominance of districts discovered in the 1870's, and the clustering of the more important districts around the Salt Lake Oasis are noticeable.

Mountains to the east and west, respectively, of the irrigated area. (See Figure 6.) The mining activity consequently reinforced, rather than lessened, the strength of the agricultural core area; if the important mines had been situated near the boundaries of the territory, successful separatist movements would almost undoubtedly have ensued. This view is supported by the fact that a bitter struggle did take place between the non-Mormon mining interests and the Mormons, predominantly farmers, for political control of the Territory. See R. Kauffman and R. W. Kauffman: *The Latter-Day Saints—A Study of Mormons in the Light of Economic Conditions*, London, 1912.

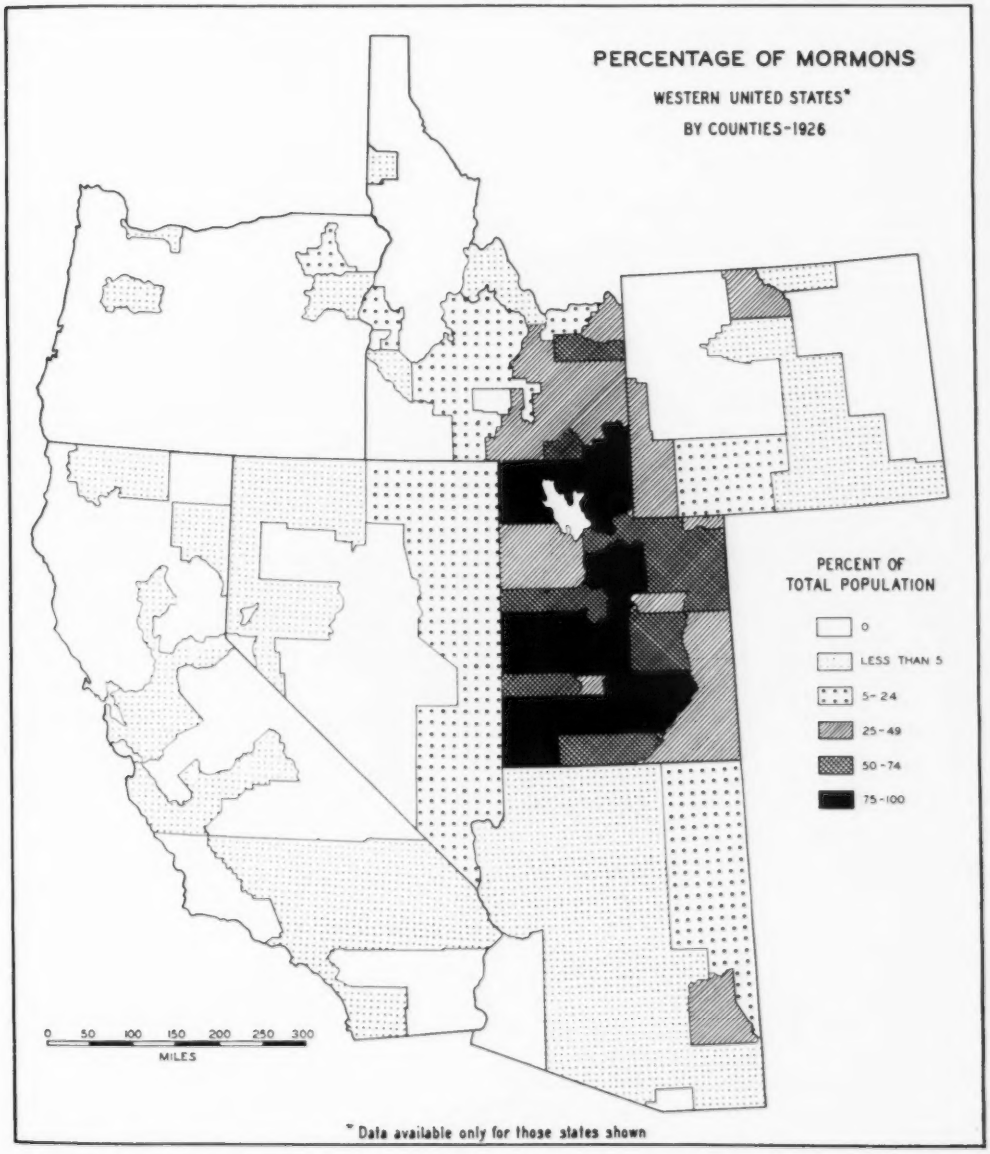

FIGURE 7.—Distribution of Mormons in western United States, showing percentage of Mormons in the total population, 1926. Data are by counties, and were available only for those states shown.

PRESENT BOUNDARIES

The adjustment of Utah's boundaries to the facts of economic geography already indicated, has enabled the state to achieve a remarkable economic and social unity. As is well known, the population of Utah is today predominantly Mormon (Figure 7), and the same combination of geographic conditions, which assisted in the achievement of a Mormon state, though limiting its areal extent, has caused the economic and population divides to coincide rather well with the state lines. This fact is emphasized by the localities chosen for Mormon settlement outside Utah after 1868. (See Figure 8.) Expansion to the south could be only in the form of distant settlements widely separated from Utah by the arid and broken country along the Colorado and San Juan rivers. Similarly, the Nevada boundary lies in the midst of a stretch of arid and almost uninhabitable lands.

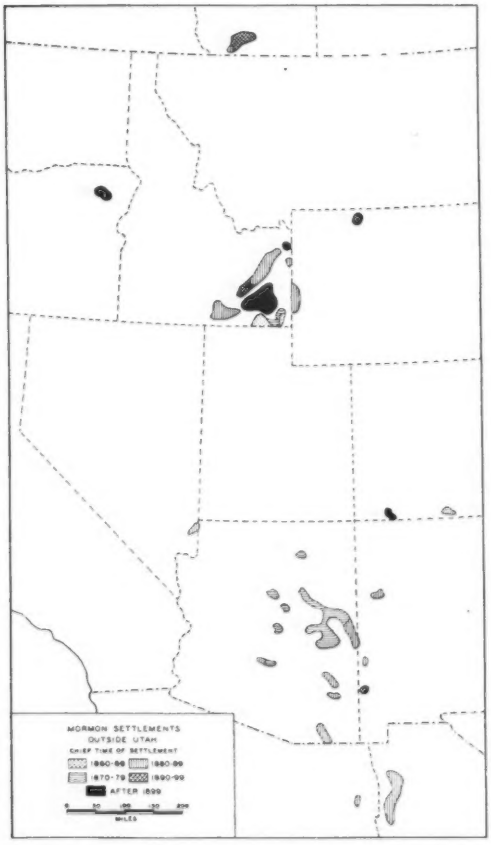

FIGURE 8.—Areas of important Mormon settlement outside Utah, showing the approximate time of settlement, and the wide separation of most of these areas from the populated part of Utah.

The location of the eastern portion of the boundary with Idaho is very different. Here irrigable lands in the north- and south-trending valleys permitted an early extension of Mormon settlement northward from the Salt Lake Oasis into southeastern Idaho. Here, as a result, the boundary of Utah makes its most important departure from the limits of the economic domaine of the Salt Lake Oasis. (See Figure 9.) The boundary with Wyoming, as has been noted, follows fairly well the population divides furnished by the Wasatch and Uinta Mountains, separating the Salt Lake Oasis from the Green River Basin, although the economic divide does not here coincide with the mountain zone.

The eastern boundary of Utah is, in general, still satisfactory, occupying as it does, the relatively unpopulated plateau country. Comparison of the maps of Mormon population, and of trade divides (Figures 7 and 9) shows, however, that a fairly large area in southeastern Utah is low in Mormons, and lies in the trade territory of Grand Junction, Colorado. This reflects the geographic character of the region; the area is suitable chiefly for extensive grazing, and hence was settled late, largely from Colorado. The low density of population makes the maladjustment a minor one.

SUMMARY

It is evident that the straight lines which form the boundaries of Utah

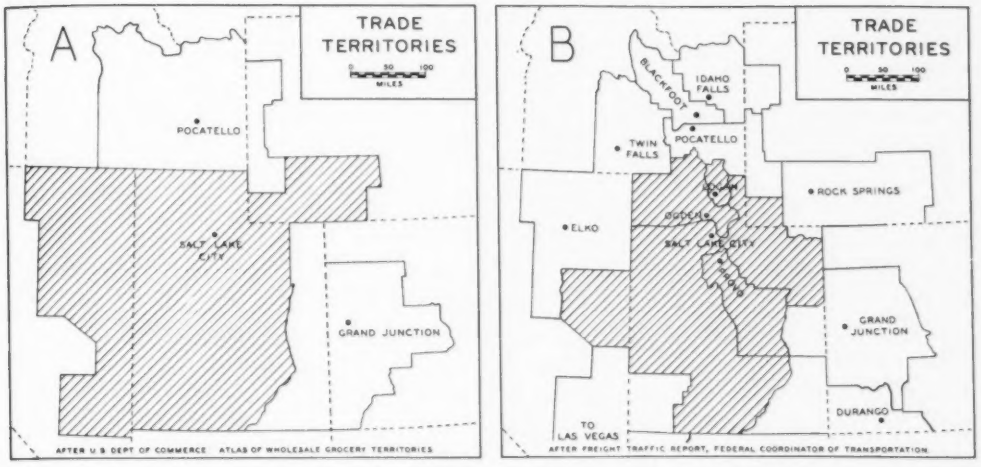

FIGURE 9.—Economic divides in the Utah area. The areas shaded are tributary to Salt Lake City or to the cities of the Salt Lake Oasis.

actually reflect the major facts of economic geography in the region, however arbitrary and irrational they may appear on a political map. In part the present position of the boundaries is fortuitous, but study of their evolution indicates that certain maladjustments caused by such changes in the economic geography as the discovery of the Comstock Lode, have been remedied (perhaps unintentionally on the part of Congress) by shifting the boundary.

The present boundaries coincide closely with the zones of sparse population which border the densely populated Salt Lake core area, where irrigation agriculture and mining are important activities. They coincide well, likewise, with the trade divides which separate the economic hinterland of Salt Lake City and the other oasis towns from that of the trade centers in neighboring states. A further indication of Utah's economic unity is that its boundaries include virtually all areas where members of the Mormon church predominate, for the areas where the Mormons have been able to remain a majority of the population have been those dominated economically by the Salt Lake Oasis core.

CENTRAL CITY MINING AREA

H. A. Hoffmeister

ALTHOUGH placer gold had been found near the present site of Denver by a party of Georgians in 1849, under the leadership of William G. Russell, no significance was attached to it until after the peak of the gold rush to California had passed. Recalling their earlier discoveries, these same men returned to their former camp site at the junction of Cherry Creek and the Platte River (Figure 1) in August, 1858. From these headquarters small parties set out to prospect the many streams emerging from the mountains. Gold was found in many places, but the deposits were discouragingly small, and, as cold weather was approaching, the prospectors returned to their base on Cherry Creek to spend the winter. Six of the party went east to obtain much needed supplies.

The report of the discovery of gold spread rapidly through the East, and hundreds of prospectors immediately set out for Colorado. A town named Auraria was created on the present site of Denver and from there a few of the more adventurous men moved into the mountains in search of the reported gold. The discovery of a deposit at Gold Run, near Gold Hill, late in 1858, and another rich placer near Idaho Springs in January, 1859, gave impetus to the rush that developed later that spring. Among the newcomers was John Gregory, a Georgian, who on May 7 made the first lode discovery in the Colorado Rockies. His find, which became known as the Gregory Lode, was located between Blackhawk and Central City (Figure 2).

The news of this discovery reached Auraria and caused another rush into the mountains. Within a few weeks placer discoveries were reported in widely scattered areas—from Gold Hill on the north, through Gamble Gulch, Rollinsville, Blackhawk, and Central City, to Idaho Springs on the south. Some of these placers were extremely rich, and yields of $100 to $400 per day were not uncommon.

Four periods, based upon the character of mineral production (Figure 3), mining and milling adjustments, and commercial exploitation of the region, stand out in the development of the region.

I. Placer and Oxidized Ore Period.....(1859–1866)
II. Sulphide Ore Period.....(1867–1890)
III. Mine and Mill Consolidation Period.....(1891–1920)
IV. Tourist-Resort Period.....(1921–1939)

Placer and Oxidized Ore Period (1859–1866)

Mining and milling adjustments in this pioneer period were temporary in character, but significant in laying the foundation for a later, more permanent industry. Only those ores were utilized which were most accessible and required the least technical milling treatment.

Placer Mining: Early discoveries of placer gold bear a close relationship to topographic conditions in the mountains. The area is part of a highly dissected peneplain and is characterized by steep, rocky slopes and high relief. Access to the mountains was least difficult along stream beds or along the few relatively flat inter-stream remnants of the old peneplain. It was along these "passes" that prospectors, pushing into the hills, made their dis-

coveries. The relationship of early gold discoveries to smaller tributary valleys and gulches is evident, for it was only in these smaller valleys and gulches, where the flow of the streams was more intermittent, that any considerable amount of the gold-bearing sand and gravel was to be found. The larger streams, with their greater volume, were eroding throughout most of their courses and only in relatively isolated places was there any deposition. Because of the ease of detecting the precious metal in the placer deposits, they were the first to attract attention.

The use of simple and primitive methods of extracting the gold from the sands was an adjustment to the wide distribution of limited placer deposits. The "claim," which extended for only one hundred feet along the stream, was soon worked out and the miner was compelled to move on to a new location. Thus, it was not economical to construct elaborate machinery and only the simplest methods were employed. For this reason, miners resorted to the "pan," the "cradle," and the "sluice box" to separate the gold from the sand and gravel.

The flow of the streams in whose beds the placers occurred was often intermittent or inadequate to carry on normal mining operations. Various adjustments were made to meet this condition, for the mining, although simple, required a considerable amount of water. The miners built dams to hold the storm water in check until needed; dug wells to tap the underflow; and, in the Central City area, constructed a canal over twelve miles of difficult terrain to bring water from Fall River.

Surface Lode Mining: Mining of the surface lode-ores represented a more

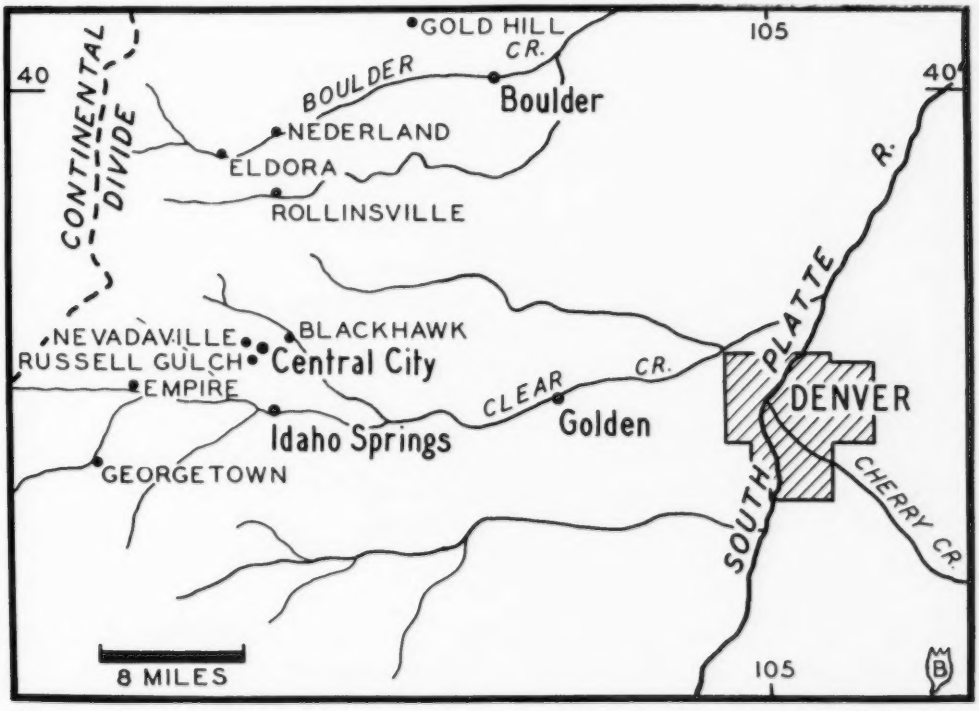

FIGURE 1.—The Central City mining area lies about thirty miles west of Denver in the heart of the front ranges from Nederland and Gold Hill on the north to Idaho Springs on the south.

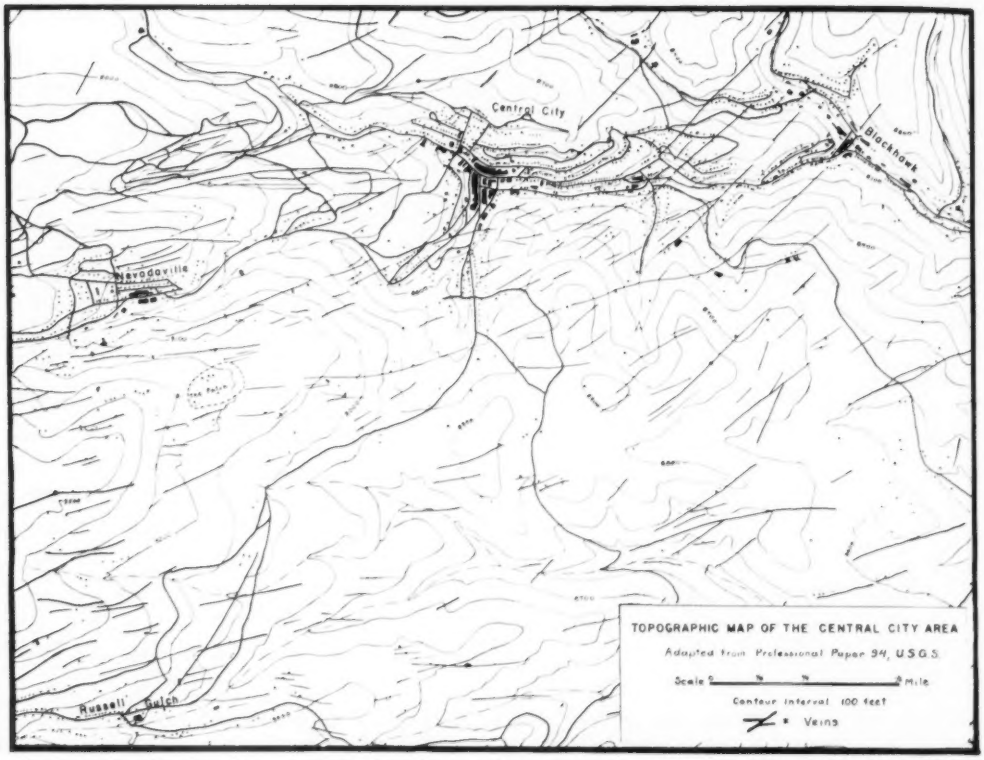

FIGURE 2.—Topographic map of the Central City area showing the distribution of buildings, roads, and mineral-bearing veins.

permanent industry than that found in the placers, as it was related to deposits of greater concentration and extent. The ore was closely associated with monzonite and monzonite dikes and stocks intruded into the granites and metamorphosed country rock. Some of the ores were found directly on the contact of the intrusives, but usually they occurred in well-defined fissure-veins that extended parallel to the parent intrusives (Figure 2). As these veins extended for considerable distances with only small variations in the character of the ore, mining was more permanent.

Mining during this period was confined largely to the free gold in the gossan zone, which extended down 50 to 100 feet from the surface of the ground. Here oxidation and leaching had liberated the gold from the sulphides and had so weathered the gangue that the ores could be mined cheaply. The mines located on the steep hillsides far outnumbered the shaft mines sunk on relatively level land. The simple tunneling and stoping along the vein facilitated removal of the ore, as the mines were opened from lower levels and stoped upwards. As mine dumps increased in size, difficulties of operating on the steep hillsides were lessened. Those mines located on more level ground, where it was necessary to sink a shaft and tunnel in along the vein, required more expensive timbering, more elaborate machinery, and a larger group of miners.

Mining operations were usually continued throughout the winter, as climate was relatively mild. Deep snow in the gulches, however, frequently made the roads to the mills impassable, so that

miners, instead of extracting ore in quantity, spent most of the winter in development work in the mine.

Milling Adjustments: Small scale milling was generally practiced as an adjustment to the small and scattered ore production. Mines were small and many were located in rather inaccessible places. Transportation facilities were as yet so poorly developed that it was not economical to haul the ore for any considerable distance. In adjustment to this situation, many small and simple mills were established near the centers of mine clusters. The enriched gold in the gossans of the vein occurred in fairly large grains and was free milling. Thus, most of the "values" could be separated from the gangue by simple crushing. At first, only the crude "arrastre" was available for the crushing, but within a short time numerous ingenious devices were employed for this purpose. However, all these devices were in turn supplanted by the more efficient stamp-mill. In this mill the ore was pulverized under a series of motor-driven, plunger-like stamps. The crushed material was then sent over amalgamating plates where the gold was caught by mercury.

Habitats and Settlements: Settlements of lode miners were sharply contrasted to those of placer miners. The transitory character of placer mining did not encourage settlement of permanent homes, nor was it conducive to group settlement. The men lived in small tents or crude log-and-brush shelters which would be abandoned as soon as the claim was worked out. However, the greater permanency and concentration of lode mining gave birth to more substantial homes and larger settlements. These "camps," located as conveniently as possible to the mines, were generally situated along the streams, where water, timber, and space were available. Mining districts, with self-imposed laws and elected officers, were established almost immediately after gold had been discovered. Thus, this region was rather unique in its orderliness and freedom from the crime and corruption that typified many gold camps of the West.

Throughout the entire period, development of the region was handicapped by lack of equipment and mining supplies. Goods from the East had to be hauled by wagon over long and difficult routes across the plains. As a result, prices of imported goods were exorbitant.

Culmination of the First Period: The close of this first period is closely related to both environmental and non-environmental factors. Placer ores were soon exhausted and the zone of free-milling, oxidized surface ores was being rapidly worked out. With appearance of the secondary zone of sulphide ores, milling became more difficult.

The California type stamp mill, with its accompanying amalgamation plates, served fairly well, while heavily oxidized surface ores were being milled. However, when the sulphide ores were reached, recovery of gold fell to about 30 per cent of the assay value. Millions of dollars were spent in unsuccessful and often fantastic milling experiments to solve the problem.

Wild speculation in mining stock followed the currency inflation at the end of the Civil War, and much money was spent in unsound development work. With the general depression of 1867, mining stock became worthless and most of the mines in this region were left idle.

Added to all this, supplies from the East were cut off and the local supply of food failed. Depredations of the Plains Indians, coupled with unusually heavy winter snows, prevented needed mining equipment from reaching the

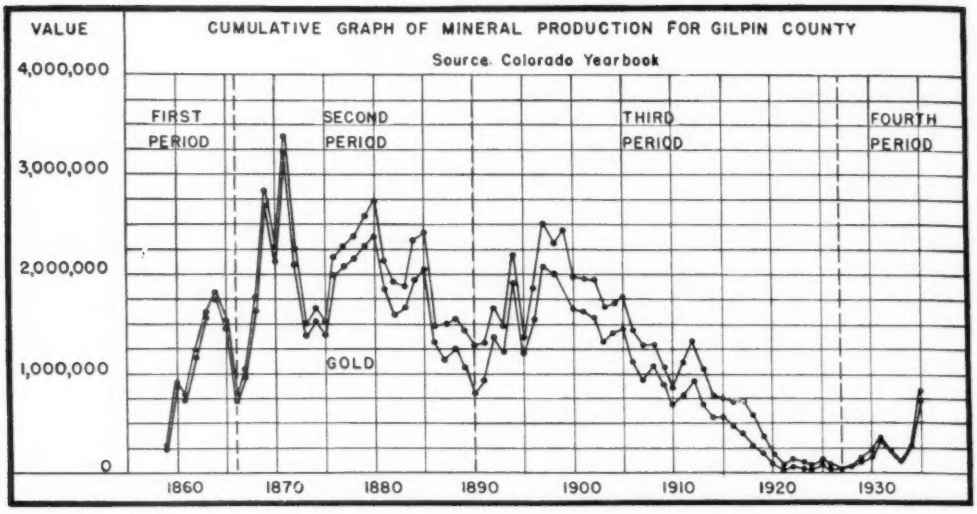

FIGURE 3.—Mineral production in Gilpin County from 1859 to 1935.

mountains. Wagon trains were turned back or were deserted on the plains. The agricultural area of the piedmont was passing through a trying period of droughts, spring floods, and grasshopper plagues. Food prices were prohibitive. It is little wonder that miners deserted their homes and sought a living elsewhere.

SULPHIDE ORE PERIOD (1867–1890)

The second period in development of the Central City area was marked by successful solution of many milling problems that had baffled earlier miners. Transportation facilities were being rapidly extended and improved throughout the period, not only within the area but from the East. This not only reduced freight costs, but made it possible to import heavy and more efficient machinery for mines and mills. Coal from the piedmont could now be used to generate power for the various operations. Living and operation costs were materially reduced, and many mines which were unable to pay a profit could now be worked.

Mining and Milling: Most of the mines had penetrated the zone of sulphides by the beginning of this period. In this zone the ores had been unaffected by surface weathering and leaching, and occurred in combination with pyrite, chalcopyrite, sphalerite, and galena. The gold, finely disseminated through the sulphides, could no longer be recovered by the simple devices employed in the previous period. However, the new Gilpin County type of stamp mill, which was being introduced in great numbers during this period, recovered much more gold than had been possible with the old type California mill. The new stamp mill crushed the ore more finely, and, prolonging the period of amalgamation, was able to recover as much as 75 per cent of the values.

Construction of several small smelters caused great enthusiasm among the miners. At first, these were rather crude affairs equipped with small calcining and smelting furnaces. The resulting matte was shipped to Swansea, Wales, for resmelting. Within a few years larger smelters, equipped to separate silver from the matte, were built in Central City, Blackhawk, and Idaho Springs. For a short time these smelters

flourished, but when it was realized that the cost of shipping coal and coke into the mountains was taking an undue amount of the profits from mining, the smelters were moved to Denver and Golden, nearer to the coal.

Transportation Developments: Wagon roads, which had been little better than pack-train trails, were greatly improved and extended during the early part of this period. The course of the roads was adjusted to features of the environment. In an area possessing such steep, irregular, and rocky slopes, cost of constructing even the simplest type of road was enormous, as the crystalline rocks were worked with difficulty and heavy blasting was required for the road bed. Precipitous slopes and trench-like gulches forced the roads to twist back and forth over the terrain, adding to their length and construction costs.

Roads were constructed, as far as possible, along the relatively flat, interstream remnants of the old peneplain or along the north side of the valleys. It was in these situations that the full force of the sun was felt throughout a greater portion of the day than on the north slopes of the mountains. Hence, drifting snow in winter and rainwater in summer were evaporated more rapidly than on shaded slopes, and as a result, roads were passable throughout most of the year.

A notable stimulus was given to mining with completion of the Union Pacific Railroad into Denver in the summer of 1870. Later in the same year the Kansas Pacific Railroad reached Denver. A narrow-gauge railroad was completed to Blackhawk in 1872. The railroad, unlike most of the wagon roads, followed along the easier grade of the streams and avoided the steep slope from plains up to peneplain flats. The tortuous winding of the canyons made it necessary to tunnel through many rocky spurs and to cross and recross streams at frequent intervals. However, the abundant supply of pine and spruce timber which mantled much of the area made bridge building comparatively inexpensive.

Town Growth: It was during this period that the area supported its greatest population. Several small mining camps grew into true mining towns, and the mills, smelters, stores, and homes of the miners lined the floor of many gulches and valleys. Blackhawk spread up the narrow valley of Gamble Creek to join onto Central City, which was expanding down the valley. So many commercial buildings, schools, churches, banks, mills, smelters, and the like had been erected in the extremely limited valley bottom, that the residential area was crowded high up on the encompassing slopes. So steep were the slopes that extensive terracing was necessary to support the narrow, winding streets. Thus, the houses of Central City and its adjoining Blackhawk perched precariously in staircase fashion, high above the valley floor (Figure 4). Most of the buildings were substantially constructed of stone and brick, and were quite unlike the crude, unfinished board structures of many other mining camps. The Central City opera, the churches, and several fraternal organizations gave an air of permanence to the area.

Culmination of the Period: From 1885 to 1890 there was a steady decrease in mining and milling activities. The value of the ores was decreasing with depth, and they were becoming so complex and refractory that the mills were unable to recover more than a small fraction of their values. As mines were sunk deeper, the volume of ground water increased at such a rate that cost of pumping made it impossible to operate many mines profitably.

Throughout all this period mining

had been characterized by small-scale operations; so when need for expensive exploratory and development work became apparent, small operators could no longer continue on their limited capital. Thus, the ground was laid for a great exodus of miners from Central City. Many mines and mills were forced to shut down, and the region went into a commercial slump. The "boom" had passed. No longer were the fabulous entertainments of "the aristocracy" maintained.

MINE AND MILL CONSOLIDATION PERIOD

During the late eighties the United States, as a result of a shortage of currency and increasing depression conditions, was subjected to a period of intensive agitation for bimetallism and currency inflation which led to passage of the Sherman Silver Purchasing Act of 1890. This Act temporarily stimulated mining all over the West, but its direct benefits were short lived, as the price of silver immediately began to decline. The decreasing value of silver was less demoralizing to the Central City area, whose wealth was primarily in gold, than to the silver camps. The Act, in intensifying the depression, was of great indirect benefit to this area. Costs of mining were greatly decreased and Eastern capital, eager to find some investment that promised a "hard cash" return, flowed into the area.

The numerous small mines that had shut down for lack of money for development work were consolidated into larger corporate holdings. Obsolete mine equipment was replaced with the most modern machinery; mills were enlarged and improved to handle ore of diverse character, collected from widely scattered mines. The invention of an ore classifier, in which crushed ore was separated according to size of the frag-

FIGURE 4.—A portion of Central City, Colorado. The surrounding hills have been denuded of their forest covering to supply mine props and fuel.

ments, and the development of the Wilfley table, a gravity ore-concentrator, brought about a marked revolution in milling technique. Less attention was given to pulverization of ore than formerly, as amalgamation became secondary to concentration. Concentrates were shipped to smelters, where in addition to the gold, the values in silver, copper, lead, and zinc were also retained. During this period both the cyanidation and chlorination processes of ore reduction were attempted, but they proved too expensive for practical use.

As size and output of the concentrating mills increased, great difficulty was encountered in disposing of the large volume of waste tailings and slimes from the mills. It was no longer possible to run them off into the streams, as the streams were becoming clogged with the finely pulverized rock material and water users farther down the stream objected to its polluted condition. In an effort to control the tailings many mills constructed "tailing ponds" out of logs and sand bags. In these the tailings would be retained, but the water would filter through the sand bags and reenter the streams comparatively clean. However, ponds were frequently washed out during a cloudburst, which occur rather frequently in the region, and the tailings would be washed out into the stream.

Culmination of the Period: Although a spirit of optimism prevailed in the decade between 1890 and 1900, and many deserted stores and houses were reoccupied, it was soon revealed that large-scale operation employing modern machinery could not accommodate the number of men formerly employed in the mines and mills. Thus Central City and its neighboring camps never regained their former size and importance.

Production costs mounted steadily after the turn of the century, and at the same time price of metals declined. Ores became increasingly complex, and their value decreased with depth. New problems developed as the quantity of underground water increased. An interesting attempt was made to drain the entire area by driving tunnels deep under the mining sections. The most spectacular of these was the Argo tunnel, started in 1904, which extended from near Idaho Springs for over four miles to a spot below Nevadaville. (The tunnel also had other purposes—to cut a number of parallel veins, to furnish haulage, and to decrease tunnel driving.) These drainage tunnels did not prove very effective, and most of the mines were forced to close down. Thus, the mining towns for the third time were largely abandoned—becoming the famous "Ghost Towns" of the Rockies.

TOURIST-RESORT PERIOD

In the last few years, induced by the high price of gold, there has been a renewed interest in mining in the area. Continued consolidation of mining properties has resulted in corporate holdings of staggering extent. It is the hope of these promoters that low-cost mining and milling of low grade ores in very large volumes and reduction of equipment and overhead costs will result in profitable operation. One of the most interesting of these experiments is being carried on near Central City. The corporation has acquired tremendous holdings and has constructed one of the most modern mills in the state. Their excavation of "the Patch," a badly shattered, mineral-impregnated, intrusive stock of low ore value, has developed one of the most interesting features of the region—"the Glory Hole." In this excavation, blasting of rock and ore from the sides of a former shaft sunk into the Patch has produced a "crater,"

300 feet in diameter and 250 feet in depth. The blasted material falls into the shaft and is removed from below through a tunnel opening out near the concentration mill.

Over a thousand tons daily of low grade ore can be handled in the mill, where both the Wilfley table and Flotation batteries are used to concentrate the minerals. The Flotation process literally reverses the old gravitation method of milling and permits the handling of extremely low grade ore. In this process the metals are carried to the surface of an oil-emulsion bath by countless air bubbles, where the concentrates are skimmed off and recovered.

The high price of gold also has stimulated placer mining. Scores of men, mostly from the ranks of the unemployed, are trying to eke out an existence reworking the streams and mine dumps. Large scale methods are being applied to placer mining with good results in several of the streams of this region. The placer-miners, employing huge Diesel-motored shovels, are running hundreds of yards of sand and gravel through modernized sluice boxes each day. The sand and gravel averages only twenty-five to fifty cents a yard in gold, but good profits are being reported.

The bustle and excitement of the thriving mining town has passed, but the glamour and the personality of the former periods will not die. The rugged beauty of the region and the romantic history of the camps that is written in every mine dump and in every weather-beaten structure now act as a magnet to draw thousands of tourists and resorters each year. Although the railroad has long since been abandoned as a result of decreased freight, the improved highways and autos have given greater accessibility to the area than ever before. For many years these camps, buried in their memories of the past, failed to capitalize on this new opportunity. But in the last decade, as is evidenced by the growing number of hotels, the opening of curio and antique shops, the revival of the Central City Opera, etc., the commercial value of the region's history is being realized. The gold which was sent out in earlier periods to enrich the East is returning to the mountains to be spent by tourists.

BOOK REVIEWS

RUDIN, HARRY R. *Germans in the Cameroons.* 456 pages. Yale University Press, 1938. Price $4.00.

HUNTER, MONICA. *Reaction to Conquest.* xx and 582 pages, illustrations and maps. Oxford University Press, 1936. Price $10.00.

HAILEY, LORD MALCOLM. *An African Survey.* xxviii and 1837 pages and maps. Oxford University Press, 1938. Price $6.25.

Harry R. Rudin in "Germans in the Cameroons" re-evaluates German colonial efforts in that colony and concludes that the accomplishment of the mother country was a very great achievement. The author does not defend or omit mention of abuses—such as certain vicious practices in the land and labor policies—but he does show that the Germans, new at colonizing, were willing to learn, and that the administration was steadily manifesting a greater concern about native well-being. This work is thoroughly documented, and the conclusion arrived at is completely opposed to that held by the makers of the Versailles Treaty and succinctly expressed by Louis Herbert Grey: "Germany's procedure in her colonies had been open to grave criticism, and that on moral grounds, as well as for political reasons, her retention of them could scarcely be justified." Indeed the author feels that Germany's colonial accomplishments in thirty short years entitle her to a very high rank as a successful colonial power.

"Reaction to Conquest" by Monica Hunter is an intensive study of the natives of Pondoland—between the province of the Cape and Natal—in their present-day relations to their physical environment, to each other, and to Europeans. Family life is dealt with in great detail. The author recognizes that the land question is the most bitter of all and closely examines the traditional background of native land tenure in its relation to modern methods of tillage and animal husbandry. The native proverb that "the land is the chief" is proved only too true in the Union of South Africa where ninety-one per cent of the land is owned by less than two million Europeans, only nine per cent by five million Bantu. The present condition is very succinctly expressed by one Bantu leader: "At first we had the land and the white man had the Bible. Now we have the Bible and the white man has the land" (p. 560). Furthermore, "the majority of those on farms have to work harder and live on a poorer diet than their ancestors" (p. 546).

The study of an urban community leads the author to conclude that it is like the usual western city in the large number of people dependent entirely upon their wage earnings and living in overcrowded slums, but unlike it in the fact that of the total number of wage earners only a small part are permanent workers; their standard of living is lower than in a white slum, and no provision is made for the sick, the aged, or the unemployed. The last thirty pages of the volume deal with tendencies, and sum up remarkably well the data presented. It is pointed out that the danger lies in the breakdown of old institutions as the result of contact with Europeans, and the failure to replace them, or the failure of institutions substituted by Europeans to function. Elasticity is demanded of Europeans in securing institutions which will work. If Bantus want chiefs instead of officials they should be administered through chiefs properly educated for their work. Racial discrimination only embitters the natives. For example, for the same crimes widely different sentences are passed on Europeans and natives. The native proverb, "the ox is skinned on one side only," is applied to European courts, which it is complained do not mete out even justice. There is a growing sense of nationalism aroused by antagonism to Europeans, and expressing itself in separatist African churches, trade unions with a strong racial and political bias, and intertribal political organizations such as the "African National Congress." This nationalist spirit tends to submerge local and tribal differences.

For all who wish to read a fascinating, well-documented work on the native of South Africa the reviewer would recommend "Reaction to Conquest."

What Miss Hunter has done for the microcosm of Pondoland, Lord Hailey has been very successful in doing for Africa south of the Sahara in "An African Survey" one of the most comprehensive of the works on Africa. After a brief survey of the physical background and the peoples of this part of Africa the systems of government are dealt with at length. The French policy of direct rule emphasizes the progressive access on the part of the natives to French culture and legal institutions, whereas the British policy of indirect rule would seem to work toward self-government based on representative institutions in the African colonies. The British system is quite flexible and should allow ready adjustments to the complex political situations of the future. Future education depends upon the policy of the governments with reference to the position the native is to occupy in the administrative and technical departments.

The exhaustive treatment of the state and the land is the really unusual feature of this volume.

The natives never had a notion of private property in land till they found themselves serfs on huge European-owned plantations, forced to work many months a year for their new white masters just in order to pay taxes. The post-war depression has possibly had one good effect in that emphasis has been placed on the maintenance of gardens by those employed on the plantations. The number of natives concerned in the cultivation of crops to be sold locally is growing, but many are still engaged solely in subsistence production. With the continued growth of a class increasingly dependent for subsistence on wage-earning, notably in the Union, new problems will arise and demand solution. Since Europeans will continue to be concerned chiefly with mining or commerce, or the management of plantations, the native should be encouraged to develop his economic life along lines complementary to those taken by the Europeans.

RAYMOND E. CRIST

COMBER, NORMAN M. *An Introduction to the Scientific Study of the Soil.* 206 pp. Published by Edward Arnold and Co., London, 1936.

SIGMOND, ALEXIUS A. J. DE. *The Principles of Soil Science.* Translated from the Hungarian by Arthur B. Yolland, edited in English translation by G. V. Jacks; foreword by Sir John Russell.

The third edition of Comber's "An Introduction to the Scientific Study of the Soil" maintains the high standard of content and style that made the previous editions so noteworthy, and presents the very latest developments in the field of Soil Science, rather fully for Great Britain, rather sketchily for the rest of the world. Since the book is intended primarily for British students and represents the material in summary that Professor Comber lays before his classes in the subject of soils, no criticism justly accrues from the relatively limited areal range of the text, the emphasis upon British soils and soil methods, or the British point of view.

It is commendable in its brevity, its clarity, and its strict elimination of all non-essential details. The text is contained within the limits of 200 small pages, printed in fairly large and open type, and yet it does not suffer by the compaction, so skillfully and capably has it been done. As an introductory book it has not been excelled; there is no better text on the market. Little attention is devoted to mere classification or areal distribution, so important particularly to geographers, but it contains all the pertinent, important material the geographer needs to understand the fundamentals of soil science. Upon the foundation this book provides, the geographer can intelligently build up his soil geography for application to his topical or regional research under his geographic discipline.

The translation into English of de Sigmond's "Principles of Soil Science" renders a very real service both to its own field and to geography. The aspects of soil science most important to the geographer—the geographic factors concerned in the genesis of soils, the geographic attributes utilized as criteria for the classification of soils, and the distribution of soils and their effect upon man's economy and culture—are all adequately discussed in this very valuable, yet not at all ponderous, book. For the geographer the book may unduly emphasize chemical processes and chemical reactions, but since these are directly modified by character of terrane, climate, and organic life, and by man's activities in the soil, they represent phenomena quite germane to the geographer's field, being in some considerable part dependent upon attributes of place.

One distinct advantage of this volume over others that have included the geographic aspects of soil science is its better balance, both from the topical and the areal points of view. The American soil scientists and the American geographers will not agree that the course of the system of classification proposed in the book, from the top, or most general and most inclusive group, to the lowermost, or most specialized unit, is so logical or so satisfactory as Marbut's opposite system, beginning with the lowermost distinguishable units and then combining them in succession in ever larger groups upon the basis of certain attributes or genetic criteria, until the major classes are achieved which accord with the distribution of major types of climate. However, the broad world point of view from which the classification is derived has exceeding merit.

It is an indispensable book for the soil scientist or the soil geographer.

W. ELMER EKBLAW

CULVER, DOROTHY CAMPBELL. *Land Utilization. A Bibliography*, and Supplement, 1937. Published by Bureau of Public Administration, University of California, Berkeley, May 15, 1935 and November 13, 1937.

In recent years a goodly list of exhaustive bibliographies on many subjects of significance to geographers has appeared, and the volumes included under this title constitute a valuable addition to the list. Land Utilization forms a natural field of application for the principles and discipline of geography, and a large proportion of American geographers are more or less directly engaged in it. To all of them particularly and to all economic geographers, as well as to economists and agriculturists, this bibliography is of inestimable value.

W. ELMER EKBLAW

LOGIO, GEORGE CLENTON. *Bulgaria, Past and Present.* 488 pages. Sherratt, Manchester, 1936. Price 12s 6d.

The title is somewhat of a misnomer for this volume since the present is treated in the first half, whereas the long historical survey is at the end. In the section on economic history Bulgaria's pre-war and post-war economic bases are studied. The country was one of the saddest victims of the World War. It lost the outlet to the Aegean Sea, which it had from 1913-1919. Furthermore, the government encumbered itself with debt in financing the housing of the huge post-war influx of refugees. The loss of the Dobruja, which represented 12 per cent of the total cultivated area, and accounted for over 20 per cent of her grain exports, has, together with the natural increase in population, forced the peasants to cultivate hilly and less fertile land, which was formerly either forested or in pasture. With the shrinking of grazing land the problem of finding feed for livestock is acute. As a remedy it is suggested that forests to be exploited for lumber be fenced off, that more forage crops be grown, and that cattle be raised instead of goats. Vast areas of once fertile land are being buried beneath tons of rubble and sand, washed by unchecked torrents from the deforested or over-grazed mountain ridges—typical Raublandschaften. It is to be hoped, however, that once graft is abolished in the granting of lumbering concessions sizable incomes will be enjoyed by the municipalities, since they own half of the three million hectares of forested lands.

As a result of the agrarian reforms since 1919 Bulgaria has become a country of small landholders. However, in certain areas subdivision of small holdings has gone so far that the people living on them are just barely able to make a living by supplementing their meager incomes with household industries of various kinds. Widely separated plots owned by the same family are in some areas being successfully consolidated. The great problem facing the country is that of providing the rural population with cheap long-term credit so that methods of agricultural production can be transformed. It is useless to give people land unless they are equipped—with knowledge and machinery—to farm it. Cooperatives have been formed, but corruption is so rampant that the members of many of them have lost money.

Some industries have been unduly favored at the expense of the national economy. To benefit a mere handful of industrialists the entire population must pay exorbitant prices for manufactured articles. Industrialism is a hothouse plant on which public money must be lavished if it is to survive; these expenditures have only widened the age-old cleavage between town and country, the farmers maintaining that the increase in the price of merchandise raised their cost of living to such an extent that their efforts to lower production costs were nullified. (Since this book was written, a law has been passed which has to a large extent curtailed state subventions to manufacturers.) In many districts small industries using agricultural products grown nearby, have developed as a response to purely local needs. The 8,700,000 sheep in the country are kept mainly for their wool, from which the peasants make their homespun clothing. The domestic wool supply is inadequate and 2,000,000 kgs. of wool and 300,000 kgs. of woolen yarn are annually exported.

Five hundred years under the Turks have made the Bulgarian peasant unsociable and suspicious; his social outlook does not extend beyond the narrow limits of his family. In his struggle for self-sufficiency he is frugal and abstemious in the extreme. A thousand years of misrule, violence, and corruption have convinced the average Bulgarian that any fraud against the State is justifiable—that "Voler l'etat n'est pas voler." The best medicine for this attitude is a strong dose of impartial, graft-free government, administered for several generations.

French *Realpolitik* has been successful in isolating Bulgaria, only to throw the latter into the arms of Germany—thus fostering what it was supposed to check, the *Drang nach Osten.*

RAYMOND E. CRIST

BENNETT, HUGH HAMMOND. *Soil Conservation.* xvii and 993 pp. Published by McGraw-Hill Book Company, New York, 1939. Price $6.00.

If one is willing, or able, to accept the premise which so large a part of our citizenry apparently now considers fully established, that the whole process of erosion constitutes a serious drain upon the agricultural resources of the nation, that America is sure to become impoverished within a relatively brief period of time unless literally billions of dollars of national income are devoted to the control of soil erosion, that much of the pristine land that the pioneers occupied and subjected to the plow and the cultivator, was "abused, ruined, and ravaged," then this "ponderous tome" (for such it is, with its thousand large pages of relatively small type and illustrations) becomes a *vade mecum* of conservation, agricultural practice, and planning. But if a person be dubious about some of the statements regarding soil conservation, the impelling need for it and some of the practices, programs, and policies for it, broadcasted so widely and indiscriminately in recent years, then the book loses some of its value—for, forsooth, "it doth protest too much!"

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There can be no doubt that there has been, still is, and likely always will be, need for conservation. The reviewer has been an ardent conservationist for decades, having enlisted in the cause under the aegis of President Van Hise of the University of Wisconsin and the elder LaFollette, and he still maintains his zeal for safeguarding, and prudent use of, all our resources —economic, cultural, aesthetic; but he has become fearful that from the almost revolutionary attitude adopted toward conservation by administrators and politicians during the last decade more harm than good may ultimately come; that in their ardent advocacy of conservation, some protagonists, some exponents, may go to excess in argument and propaganda, without due regard for fundamentally sound fact and doctrine, and thus imperil the final, reasonable success of the movement.

In its entirety, this massive monograph of Bennett's conveys an impression of intemperateness rather than deliberateness and reserve; of exaggeration rather than conservativeness, as if it had to justify itself by weight of argument, even though some of that argument might be specious, by multiplicity of examples, even though some of those examples might be open to question, rather than by authenticated, indubitable proof that could not be assailed, by a few examples that could not be misinterpreted.

Despite these objections and doubts, the reviewer considers that "Soil Conservation" is an important and valuable contribution to the literature of the economic doctrine of our time, and worthy a place on the reference shelf of every scientist, whether or not he be interested in soils, or in conservation. He would emphasize that there is a great deal more of sound, than of doubtful, value in the book, and that the author has rendered an incalculable service in compiling, organizing, and presenting so clearly, such a vast array of material.

The book is well bound, the paper is superior, the type satisfactory, the illustrations significant and the engraving praiseworthy; the book constitutes a good example of excellent mechanical craftsmanship.

W. ELMER EKBLAW